

THE YEAR BOOK FOR COLORISTS & DYERS

VOLUME I

1898

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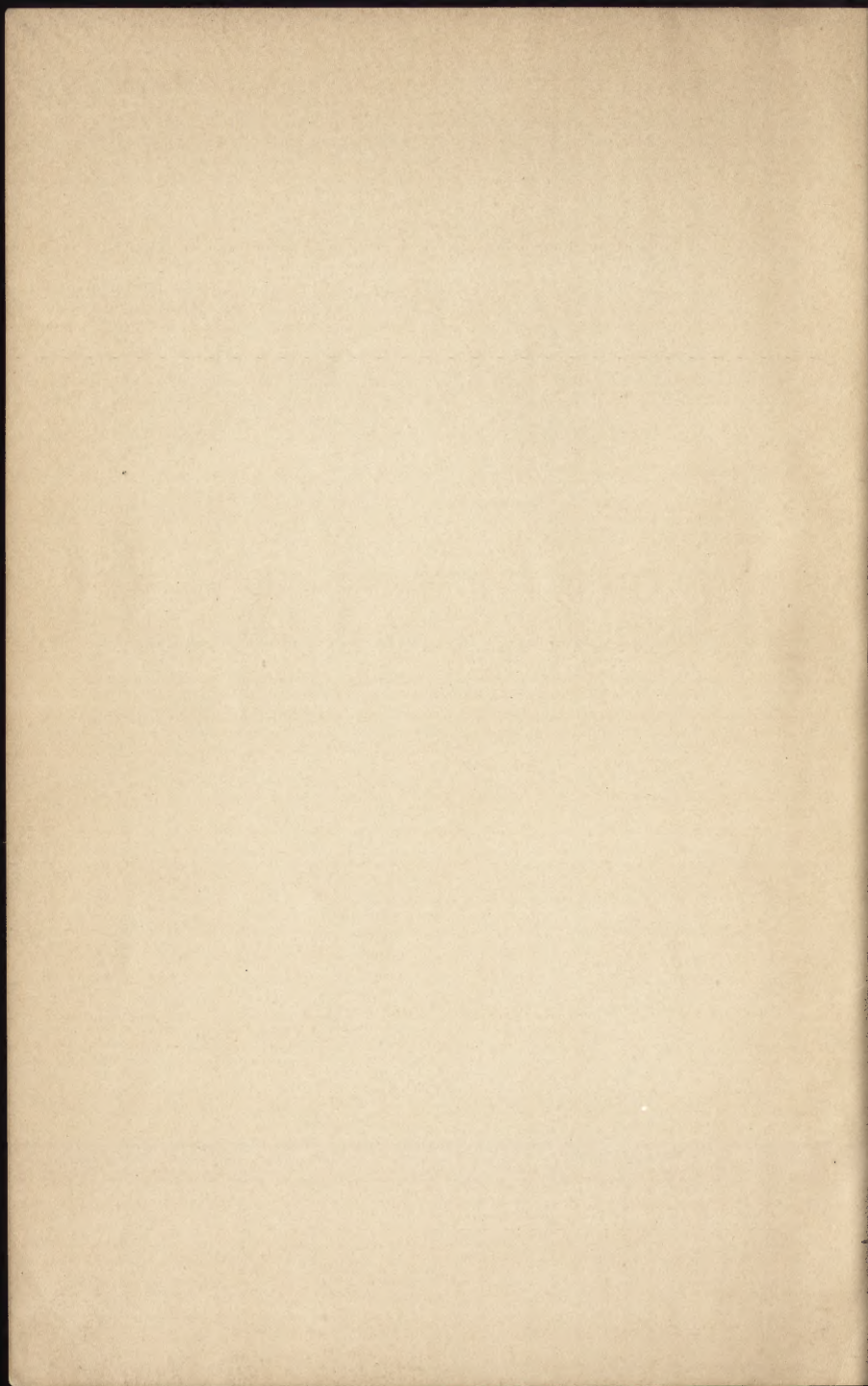
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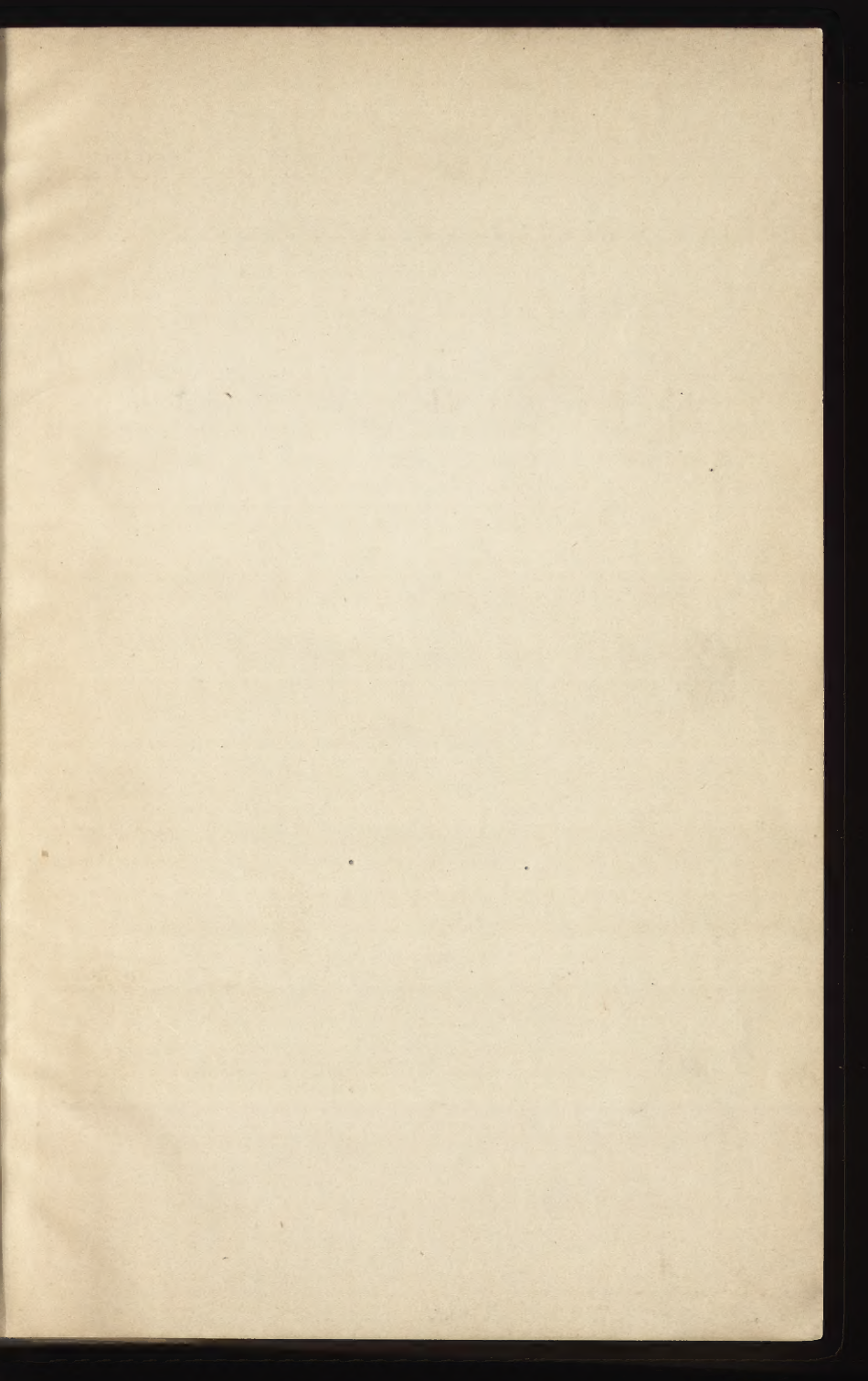
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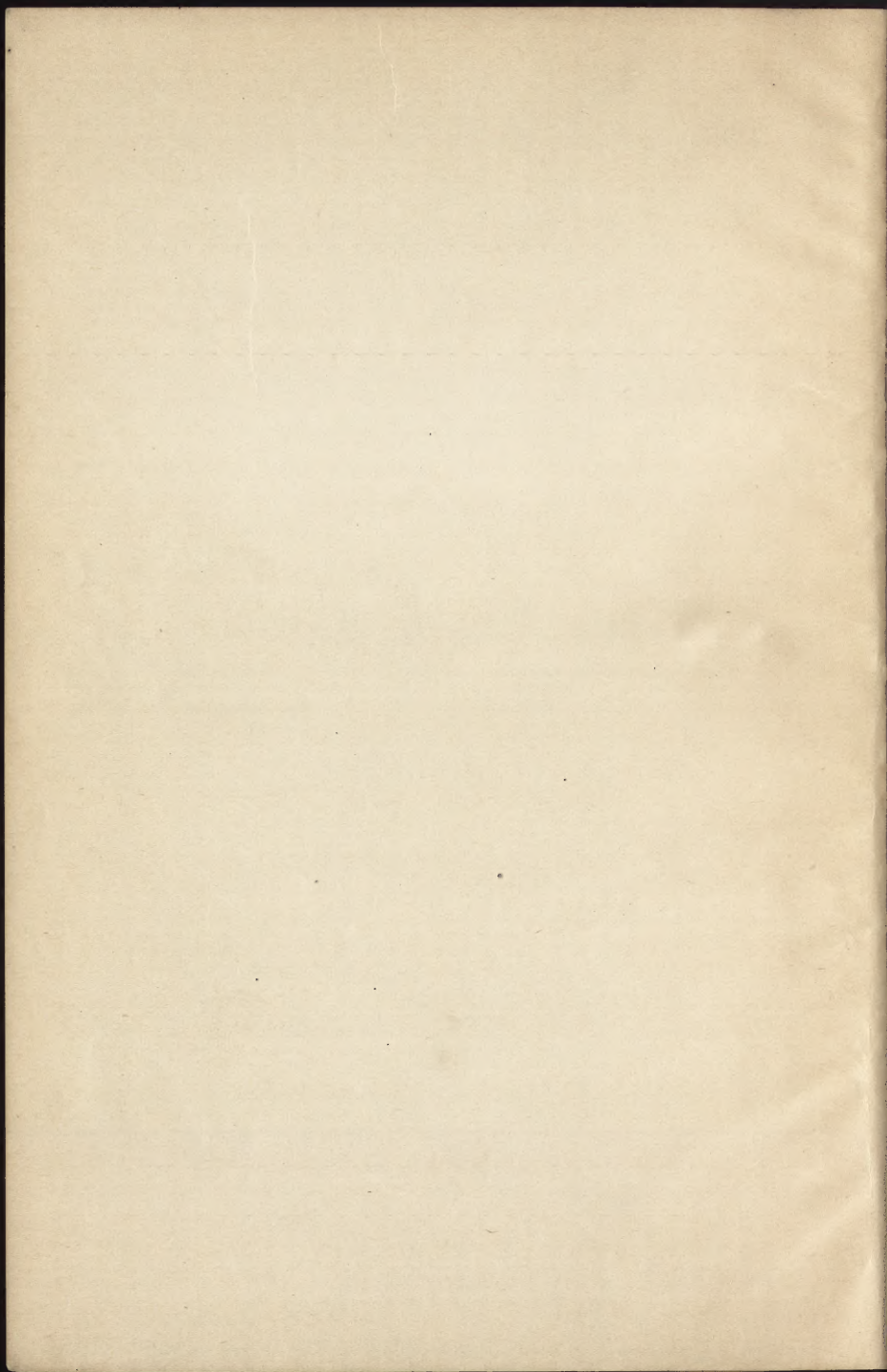
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Dec. 24th 1898







THE YEAR-BOOK
FOR
COLORISTS AND DYERS

Presenting a Review of the Year's
Advances in the Bleaching, Dyeing,
Printing, and Finishing of Textiles

FRANKLIN INSTITUTE
BY
HARWOOD HUNTINGTON
PHILADELPHIA

VOLUME I

NEW YORK :: 1898

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PREFACE.

So far as I am aware, there are no portable works in the English language to which a color-chemist can refer and find the information which he requires the oftenest.

The need of a concise recapitulation of advances made annually in the special field worked in by dyers and colorists has long been felt. New books and literature come along in such wheelbarrow-loads, and the number of periodicals has increased to such a large extent, that it is difficult for anyone who does not make a specialty of the subject to keep abreast with the times.

The object of this year-book is to meet this demand with accuracy and brevity. Such work, thoroughly and conscientiously done, cannot do otherwise than produce a book of value to those working in color-chemistry.

It is not meant to replace the larger books, but simply to serve as a *vade mecum*. The compiler will be abundantly repaid if the industry is advanced in some measure by this publication.

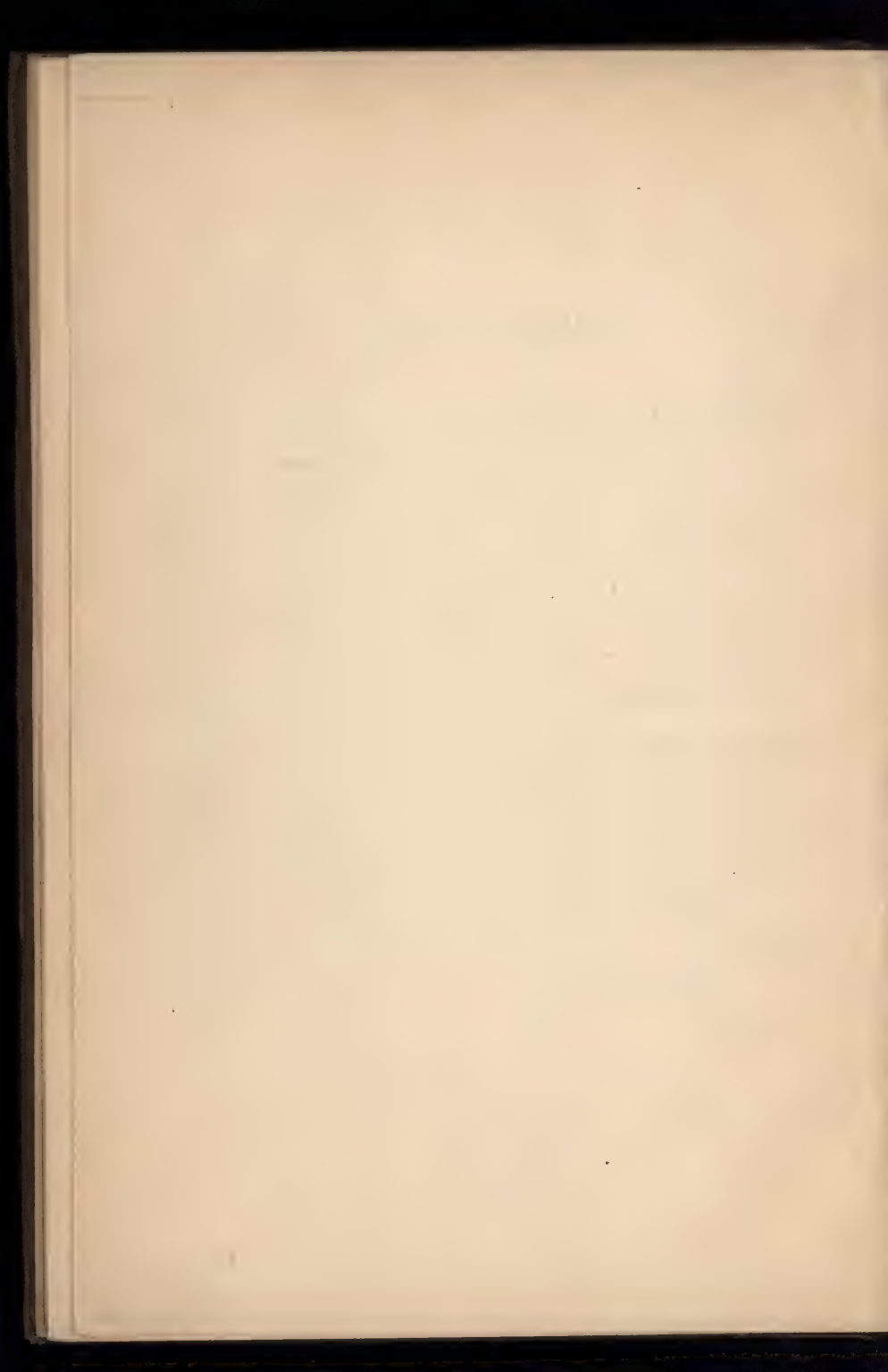
It is hoped that kind friends will call attention to any mistakes or any omissions, so that these may be remedied in the issue of next year.

HARWOOD HUNTINGTON.

NEW YORK CITY, October, 1898.

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PART I.—TABLES.

COMPARISON OF METRIC SYSTEM WITH THE UNITED STATES METHOD OF WEIGHTS AND MEASURES.

(Arranged in Alphabetical Order.)

Are (100 square meters)	=	119.6 square yards.
Bushel	=	2150.42 cubic inches, 35.24 liters.
Centare (1 square meter)	=	1,550 square inches.
Centigram (1/100 gram)	=	0.1543 grain.
Centiliter (1/100 liter)	=	2.71 fluid drams, 0.338 fluid ounce.
Centimeter (1/100 meter)	=	0.3937 inch.
1 Cubic centimeter	=	16.23 minims (Apothecaries).
10 " centimeters	=	2.71 fluid drams (Apothecaries).
30 " "	=	1.01 " ounces "
100 " "	=	3.38 " " "
473 " "	=	16.00 " " "
500 " "	=	16.90 " " "
1,000 " "	=	33.81 " " "
Decigram (1/10 gram)	=	1.5432 grains.
Decimeter (1/10 meter)	=	3.937 inches.
Deciliter (1/10 liter)	=	0.845 gill.
Dekagram (10 grams)	=	0.3527 ounce.
Dekaliter (10 liters)	=	9.08 quarts (dry), 2.6418 gallons.
Dekameter (10 meters)	=	393.7 inches.
Dram	=	1.772 grams.
Dram (Apothecaries or Troy)	=	3.9 grams.
Foot	=	0.3048 meter, or 30.48 centimeters.
Gallon	=	4,543 liters.
Gill	=	0.118295 liter, or 142 cubic centimeters.
Grain (Troy)	=	0.064804 gram.
Grain	=	0.0648 gram.
Gram	=	15.432 grains.
Hectare (10,000 square meters)	=	2.471 acres.

Hectogram = 3.5274 ounces.
 Hectoliter (100 liters) = 2.838 bushels, or 26.418 gallons.
 Hectometer (100 meters) = 328 feet 1 inch.
 Hundredweight (112 pounds Avoirdupois) = 50.8 kilograms.
 Inch = 0.0254 meter.
 Inch = 2.54 centimeters.
 Inch = 25.40 millimeters.
 Kilogram = 2.2046 pounds, or 35.274 ounces.
 Kiloliter (1,000 liters) = 1.308 cubic yards, or 264.18 gallons.
 Kilometer (1,000 meters) = 0.62137 mile (3,280 feet 10 inches).
 Liter = 1.0567 quarts, 0.264 gallon (liquid), or 0.908 quart (dry).
 Meter = 39.3704 inches, or 3.28087 feet.
 Mile = 1.609 kilometers.
 Mile = 5,280 feet, or 1609.3 meters.
 Millier or tonneau = 2,204.6 pounds.
 Milligram = 0.0154 grain.
 Millimeter (1/1,000 meter) = 0.0394 inch.
 Myriagram = 22.046 pounds.
 Myriameter (10,000 meters) = 6.2137 miles.
 Ounce (Avoirdupois) = 28.350 grams.
 Ounce (fluid) = 28.3966 cubic centimeters.
 Ounce (Troy or Apothecaries) = 31.104 grams.
 Ounce (Avoirdupois) = 28.35 grams.
 Peck = 9.08 liters.
 Pint (liquid) = 0.47318 liter (liquid), or 0.568 (dry).
 Pound (Avoirdupois) = 453.603 grams.
 Pound (English) = 0.453 kilogram.
 Pound (Troy) = 373.25 grams.
 Quart = 1.1352 liters.
 Quart (liquid) = 0.94636 liter.
 Quintal = 220.46 pounds.
 Scruple (Troy) = 1.296008 grams.
 Ton = 20 hundredweight = 2,240 pounds (Avoirdupois)
 1016.070 kilograms.
 Yard = 0.9144 meter.

APPROXIMATE EQUIVALENTS.

Centimeter, about 1/3 inch.
 Cubic centimeter, about a thimbleful.
 Dime, about 2½ grams.

Dollar, silver, weighs about 25 grams.
 Five-cent nickel, about 5 grams.
 Kilogram, about 2 pounds.
 Kilometer, about $\frac{1}{2}$ mile.
 Liter, about a quart.
 Meter, about a yard.

LONG MEASURE.

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$5\frac{1}{2}$ yards	= 1 rod (rd.)
40 rods	= 1 furlong (fur.)
8 furlongs	= 1 mile (m.)
3 miles	= 1 league

SURFACE OR SQUARE MEASURE.

144 square inches	= 1 square foot.
9 square feet	= 1 square yard
$30\frac{1}{4}$ square yards	= 1 square rod or perch
160 square rods	= 1 acre

Measure 209 feet on each side, and you have a square acre approximately.

CUBIC MEASURE.

1,728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
40 cubic feet of round timber, or	} = 1 ton or load (t.)
50 cubic feet of hewn timber	
16 cubic feet	= 1 cord foot (cd. ft.)
8 cord feet, or	} = 1 cord of wood (cd.)
128 cubic feet	

LIQUID OR WINE MEASURE.

4 gills (gi.)	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

DRY MEASURE.

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

APOTHECARIES' WEIGHT.

20 grains	= 1 scruple
3 scruples	= 1 dram
8 drams	= 1 ounce
12 ounces	= 1 pound

AVOIRDUPOIS, OR COMMERCIAL WEIGHT.

27.34375 grains	= 1 dram
16 drams	= 1 ounce = $437\frac{1}{2}$ grains
16 ounces	= 1 pound = 256 drams = 7,000 grains.
28 pounds	= 1 quarter = 448 ounces
4 quarters	= 1 hundredweight = 112 pounds
20 hundredweights	= 1 ton = 80 quarters = 2,240 pounds.

The standard of the avoirdupois, which is the one in common commercial use, is the weight of 27.7015 cubic inches of pure distilled water, at its maximum density at about 39° F., in latitude of London, at the level of the sea, barometer at 30". But this involves an error of about 1 part in 1,362, for the 1 pound of water = 27.68122 cubic inches.

A troy pound = 0.82286 avoirdupois pound. An avoirdupois pound = 1.21528 troy pound, or apothecaries.

A troy ounce = 1.09714 avoirdupois ounce. An avoirdupois ounce = 0.911458 troy ounce or apothecaries.

Where we use the word "ton" we always mean 2,240 pounds, because that is its meaning in United States law.

MISCELLANEOUS WEIGHTS.

Barrel of flour	= 196 pounds.
Barrel of salt	= 280 pounds.
Bale of cotton (in America)	= 400 pounds.

Bale of cotton (in Egypt) = 90 pounds.

Bag of Sea Island cotton = 300 pounds.

Cable = 120 fathoms.

Cask of lime = 240 pounds.

Fathom = 6 feet.

Hand = 4 inches.

Hogshead = 63 gallons.

Keg (nails) = 100 pounds.

Pace = 3.3 feet.

Palm = 3 inches.

Pipe = 2 hogsheads.

Stone = 14 pounds.

Tun = 2 pipes.

Cubic foot of water weighs 62.4 pounds.

Cubic foot of water is 7.48 gallons.

Gallon of water weighs $8\frac{1}{2}$ pounds.

Gallon of water is 1,728 cubic inches.

In England, wool is sold by the sack, or boll, of 22 stones, which, at 14 pounds the stone, is 308 pounds.

A pack of wool is 17 stones and 2 pounds, which is rated as a pack load for a horse. It is 240 pounds.

A tod of wool is 2 stones of 14 pounds.

A wey of wool is $6\frac{1}{4}$ tods. Two weys, a sack.

A clove of wool is half a stone.

TABLE OF MULTIPLES.

Centimeters $\times 0.3937$ = inches.

Centimeters $\times 0.0328$ = feet.

Centimeters, cubic, $\times 0.0338$ = apothecaries' fluid ounces

Diameter of a circle $\times 3.1416$ = circumference.

Gallons $\times 3.785$ = liters.

Gallons $\times 0.833565$ = imperial gallons.

Gallons $\times 8.33505$ = pounds of water.

Gallons, imperial, $\times 1.199666$ = U. S. gallons.

Gallons, imperial, $\times 10$ = pounds of water.

Gallons, imperial, $\times 4.54102$ = liters.

Grains $\times 0.0648$ = grams.

Inches $\times 0.0254$ = meters.

Inches $\times 25.4$ = millimeters.

Miles $\times 1.609 =$ kilometers.

Ounces, Troy, $\times 1.097 =$ ounces of avoirdupois.

Ounces, avoirdupois, $\times 0.9115 =$ ounces Troy.

Pounds, avoirdupois, $\times 0.4536 =$ kilograms.

Pounds, avoirdupois, $\times 0.8228571 =$ pounds Troy.

Pounds, Troy, $\times 0.37286 =$ kilograms.

Pounds, Troy, $\times 1.21527 =$ pounds avoirdupois.

Radius of a circle $\times 6.283185 =$ circumference.

Square of the radius $\times 3.1416 =$ area.

Square of the diameter of a circle $\times 0.7854 =$ area.

Square of the circumference of a circle $\times 0.07958 =$ area.

APPROXIMATE METHOD FOR ROUND VATS.

RULE.—Multiply the depth in feet by the diameter in feet, and that product by $1\frac{1}{2}$, and you have the number of barrels of $31\frac{1}{2}$ gallons each.

ANOTHER RULE FOR THE MEASUREMENT OF CYLINDRICAL CISTERNS.

Take the length, width, and depth in feet; multiply these together, and the product by 1,865; cut off four figures on the right, and the result will be the contents in barrels.

THERMOMETRY.

Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
—10	—23.33	2	—16.67	14	—10.00
—9	—22.78	3	—16.11	15	—9.44
—8	—22.22	4	—15.56	16	—8.89
—7	—21.67	5	—15.00	17	—8.33
—6	—21.11	6	—14.44	18	—7.73
—5	—20.56	7	—13.89	19	—7.22
—4	—20.00	8	—13.33	20	—6.67
—3	—19.44	9	—12.78	21	—6.11
—2	—18.89	10	—12.22	22	—5.56
—1	—18.33	11	—11.67	23	—5.00
0	—17.78	12	—11.11	24	—4.44
1	—17.22	13	—10.56	25	—3.89

TABLES.

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Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
26	— 3.33	66	18.89	106	41.12
27	— 2.78	67	19.44	107	41.67
28	— 2.22	68	20.00	108	42.23
29	— 1.67	69	20.56	109	42.78
30	— 1.11	70	21.11	110	43.34
31	— 0.56	71	21.67	111	43.89
32	— 0.00	72	22.22	112	44.45
33	0.56	73	22.78	113	45.00
34	1.11	74	23.33	114	45.56
35	1.67	75	23.89	115	46.22
36	2.22	76	24.44	116	46.67
37	2.78	77	25.00	117	47.23
38	3.33	78	25.56	118	47.78
39	3.89	79	26.11	119	48.34
40	4.44	80	26.67	120	48.89
41	5.00	81	27.22	121	49.45
42	5.56	82	27.78	122	50.00
43	6.11	83	28.33	123	50.56
44	6.67	84	28.89	124	51.12
45	7.22	85	29.44	125	51.67
46	7.78	86	30.00	126	52.23
47	8.33	87	30.56	127	52.78
48	8.89	88	31.11	128	53.34
49	9.44	89	31.67	129	53.89
50	10.00	90	32.22	130	54.45
51	10.56	91	32.78	131	55.00
52	11.11	92	33.33	132	55.56
53	11.67	93	33.89	133	56.12
54	12.22	94	34.44	134	56.67
55	12.78	95	35.00	135	57.23
56	13.33	96	35.56	136	57.78
57	13.89	97	36.11	137	58.34
58	14.44	98	36.67	138	58.89
59	15.00	99	37.22	139	59.45
60	15.56	100	37.78	140	60.00
61	16.11	101	38.34	141	60.56
62	16.67	102	38.89	142	61.12
63	17.22	103	39.45	143	61.67
64	17.78	104	40.00	144	62.23
65	18.33	105	40.56	145	62.78

Fahr.	Centigr.	Fahr.	Centigr.	Fahr.	Centigr.
146	63.34	187	86.12	227	108.33
147	63.89	188	86.67	228	108.89
148	64.45	189	87.23	229	109.44
149	65.00	190	87.78	230	110.00
150	65.56	191	88.34	231	110.55
151	66.12	192	88.89	232	111.11
152	66.67	193	89.45	233	111.67
153	67.23	194	90.00	234	112.22
154	67.78	195	90.56	235	112.78
155	68.34	196	91.12	236	113.33
156	68.89	197	91.67	237	113.89
157	69.45	198	92.23	238	114.44
158	70.00	199	92.78	239	115.00
159	70.56	200	93.34	240	115.55
160	71.12	201	93.89	241	116.11
161	71.67	202	94.44	242	116.67
162	72.23	203	95.00	243	117.22
163	72.78	204	95.55	244	117.78
164	73.34	205	96.11	245	118.33
165	73.89	206	96.67	246	118.89
166	74.45	207	97.22	247	119.44
167	75.00	208	97.78	248	120.00
168	75.56	209	98.33	249	120.55
169	76.12	210	98.89	250	121.11
170	76.67	211	99.44	251	121.67
171	77.23	212	100.00	252	122.22
172	77.78	213	100.55	253	122.78
173	78.34	214	101.11	254	123.33
174	78.89	215	101.67	255	123.89
175	79.45	216	102.22	256	124.44
176	80.00	217	102.78	257	125.00
177	80.56	218	103.33	258	125.55
178	81.12	219	103.89	259	126.11
179	81.67	220	104.44	260	126.67
180	82.23	221	105.00	261	127.22
181	82.78	222	105.55	262	127.78
182	83.34	223	106.11	263	128.33
183	83.89	224	106.67	264	128.89
184	84.45	225	107.22	265	129.44
185	85.00	226	107.78	266	130.00
186	85.56				

ANOTHER METHOD TO TRANSFORM FAHRENHEIT TO CENTIGRADE, or *vice versa*, is the formula:

$$\frac{C \times 9}{5} + 32 \text{ equals Fahrenheit.}$$

$$F - 32 \times \frac{5}{9} \text{ equals Centigrade.}$$

ANOTHER WAY TO CONVERT FAHRENHEIT TO CENTIGRADE DEGREES, subtract 32 and divide by 2; then add to this 1/10 of itself, and, if further accuracy is desired, 1/100 more.

COMPARISON BETWEEN THE SCALES OF FAHRENHEIT, REAUMUR AND THE CENTIGRADE.

(Zero Fahrenheit corresponds with minus 17.78 Centigrade and minus 14.22 Réaumur.)

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
100	212	80	79	174.2	63.2
99	210.2	79.2	78	172.4	62.4
98	208.4	78.4	77	170.6	61.6
97	206.6	77.6	76	168.8	60.8
96	204.8	76.8	75	167	60
95	203	76	74	165.2	59.2
94	201.2	75.2	73	163.4	58.4
93	199.4	74.4	72	161.6	57.6
92	197.6	73.6	71	159.8	56.8
91	195.8	72.8	70	158	56
90	194	72	69	156.2	55.2
89	192.2	71.2	68	154.4	54.4
88	190.4	70.4	67	152.6	53.6
87	188.6	69.6	66	150.8	52.8
86	186.8	68.8	65	149	52
85	185	68	64	147.2	51.2
84	183.2	67.2	63	145.4	50.4
83	181.4	66.4	62	143.6	49.6
82	179.6	65.6	61	141.8	48.8
81	177.8	64.8	60	140	48
80	176	64	59	138.2	47.2

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Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
58	136.4	46.4	18	64.4	14.4
57	134.6	45.6	17	62.6	13.6
56	132.8	44.8	16	60.8	12.8
55	131	44	15	59	12
54	129.2	43.2	14	57.2	11.2
53	127.4	42.4	13	55.4	10.4
52	125.6	41.6	12	53.6	9.6
51	123.8	40.8	11	51.8	8.8
50	122	40	10	50	8
49	120.2	39.2	9	48.2	7.2
48	118.4	38.4	8	46.4	6.4
47	116.6	37.6	7	44.6	5.6
46	114.8	36.8	6	42.8	4.8
45	113	36	5	41	4
44	111.2	35.2	4	39.2	3.2
43	109.4	34.4	3	37.4	2.4
42	107.6	33.6	2	35.6	1.6
41	105.8	32.8	1	33.8	0.8
40	104	32	Zero	32	Zero
39	102.2	31.2	1	30.2	0.8
38	100.4	30.4	2	28.4	1.6
37	98.6	29.6	3	26.6	2.4
36	96.8	28.8	4	24.8	3.2
35	95	28	5	23	4
34	93.2	27.2	6	21.2	4.8
33	91.4	26.4	7	19.4	5.6
32	89.6	25.6	8	17.6	6.4
31	87.8	24.8	9	15.8	7.2
30	86	24	10	14	8
29	84.2	23.2	11	12.2	8.8
28	82.4	22.4	12	10.4	9.6
27	80.6	21.6	13	8.6	10.4
26	78.8	20.8	14	6.8	11.2
25	77	20	15	5	12
24	75.2	19.2	16	3.2	12.8
23	73.4	18.4	17	1.4	13.6
22	71.6	17.6	18	—	14.4
21	69.8	16.8	19	2.2	15.2
20	68	16	20	4	16
19	66.2	15.2	21	5.8	16.8

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
22	7.6	17.6	36	32.8	28.8
23	9.4	18.4	37	34.6	29.6
24	11.2	19.2	38	36.4	30.4
25	13	20	39	38.2	31.2
26	14.8	20.8	40	40	32
27	16.6	21.6	41	41.8	32.8
28	18.4	22.4	42	43.6	33.6
29	20.2	23.2	43	45.4	34.4
30	22	24	44	47.2	35.2
31	23.8	24.8	45	49	36
32	25.6	25.6	46	50.8	36.8
33	27.4	26.4	47	52.6	37.6
34	29.2	27.2	48	54.4	38.4
35	31	28	49	56.2	39.2

SULPHURIC ACID.

The Manufacturing Chemists' Association have adopted the following figures as representing the per cent. of H_2SO_4 in an oil of vitriol. Since colorists rarely or never need to look up an acid below 80 per cent. oil of vitriol, the table only goes to that degree.

Beaumé.	Sp. Gr.	H_2SO_4 .	Oil Vitriol.
66	1.835	93.50	100
65	1.814	88.82	95
64	1.793	86.02	92
63	1.767	83.21	89
62	1.747	81.34	87
61	1.727	79.47	85
60	1.705	77.60	83
59	1.683	75.73	81

AREOMETRY OR HYDROMETRY.

COMPARISON BETWEEN THE SPECIFIC GRAVITY OF BEAUMÉ AND TWADDLE.

Tw.	B.	Sp. Gr.	Tw.	B.	Sp. Gr.	Tw.	B.	Sp. Gr.	Tw.	B.	Sp. Gr.
0	0	1.000	44	26.0	1.220	88	44.1	1.440	132	57.4	1.660
1	0.7	1.005	45	26.4	1.225	89	44.4	1.445	133	57.7	1.665
2	1.4	1.010	46	26.9	1.230	90	44.8	1.450	134	57.9	1.670
3	2.1	1.015	47	27.4	1.235	91	45.1	1.455	135	58.2	1.675
4	2.7	1.020	48	27.9	1.240	92	45.4	1.460	136	58.4	1.680
5	3.4	1.025	49	28.4	1.245	93	45.8	1.465	137	58.7	1.685
6	4.1	1.030	50	28.8	1.250	94	46.1	1.470	138	58.9	1.690
7	4.7	1.035	51	29.3	1.255	95	46.4	1.475	139	59.2	1.695
8	5.4	1.040	52	29.7	1.260	96	46.8	1.480	140	59.5	1.700
9	6.0	1.045	53	30.2	1.265	97	47.1	1.485	141	59.7	1.705
10	6.7	1.050	54	30.6	1.270	98	47.4	1.490	142	60.0	1.710
11	7.4	1.055	55	31.1	1.275	99	47.8	1.495	143	60.2	1.715
12	8.0	1.060	56	31.5	1.280	100	48.1	1.500	144	60.4	1.720
13	8.7	1.065	57	32.0	1.285	101	48.4	1.505	145	60.6	1.725
14	9.4	1.070	58	32.4	1.290	102	48.7	1.510	146	60.9	1.730
15	10.0	1.075	59	32.8	1.295	103	49.0	1.515	147	61.1	1.735
16	10.6	1.080	60	33.3	1.300	104	49.4	1.520	148	61.4	1.740
17	11.2	1.085	61	33.7	1.305	105	49.7	1.525	149	61.6	1.745
18	11.9	1.090	62	34.2	1.310	106	50.0	1.530	150	61.8	1.750
19	12.4	1.095	63	34.6	1.315	107	50.3	1.535	151	62.1	1.755
20	13.0	1.100	64	35.0	1.320	108	50.6	1.540	152	62.3	1.760
21	13.6	1.105	65	35.4	1.325	109	50.9	1.545	153	62.5	1.765
22	14.2	1.110	66	35.8	1.330	110	51.2	1.550	154	62.8	1.770
23	14.9	1.115	67	36.2	1.335	111	51.5	1.555	155	63.0	1.775
24	15.4	1.120	68	36.6	1.340	112	51.8	1.560	156	63.2	1.780
25	16.0	1.125	69	37.0	1.345	113	52.1	1.565	157	63.5	1.785
26	16.5	1.130	70	37.4	1.350	114	52.4	1.570	158	63.7	1.790
27	17.1	1.135	71	37.8	1.355	115	52.7	1.575	159	64.0	1.795
28	17.7	1.140	72	38.2	1.360	116	53.0	1.580	160	64.2	1.800
29	18.3	1.145	73	38.6	1.365	117	53.3	1.585	161	64.4	1.805
30	18.8	1.150	74	39.0	1.370	118	53.6	1.590	162	64.6	1.810
31	19.3	1.155	75	39.4	1.375	119	53.9	1.595	163	64.8	1.815
32	19.8	1.160	76	39.8	1.380	120	54.1	1.600	164	65.0	1.820
33	20.3	1.165	77	40.1	1.385	121	54.4	1.605	165	65.2	1.825
34	20.9	1.170	78	40.5	1.390	122	54.7	1.610	166	65.5	1.830
35	21.4	1.175	79	40.8	1.395	123	55.0	1.615	167	65.7	1.835
36	22.0	1.180	80	41.2	1.400	124	55.2	1.620	168	65.9	1.840
37	22.5	1.185	81	41.6	1.405	125	55.5	1.625	169	66.1	1.845
38	23.0	1.190	82	42.0	1.410	126	55.8	1.630	170	66.3	1.850
39	23.5	1.195	83	42.3	1.415	127	56.0	1.635	171	66.5	1.855
40	24.0	1.200	84	42.7	1.420	128	56.3	1.640	172	66.7	1.860
41	24.5	1.205	85	43.1	1.425	129	56.6	1.645	173	67.0	1.865
42	25.0	1.210	86	43.4	1.430	130	56.9	1.650			
43	25.5	1.215	87	43.8	1.435	131	57.1	1.655			

If the sample is too viscous to determine the density directly, a weighed portion of it can be first diluted with a weighed quantity of water, or a weighed portion can be dissolved and diluted to a known volume with water. In the first instance the per cent. of total solids is to be calculated by the following formula:

$$\text{Per cent. of solids in the undiluted material} = \frac{WS}{w}$$

S = per cent. of solids in the diluted material.

W = weight of the diluted material.

w = weight of the sample taken for dilution.

If the dilution was made to a definite volume, the following formula is to be used:

$$\text{Per cent. of solids in the undiluted material} = \frac{VDS}{w}$$

V = volume of the diluted solution.

D = specific gravity of the diluted solution.

S = per cent. of solids in the diluted solution.

w = weight of the sample taken for dilution.

To reduce a liquid to a desired specific gravity:

Let v equal the volume of the first liquid.

Let B " " Beaumé of the first liquid.

Let b " " Beaumé of the second or reducing liquid.

Let a " " Beaumé required.

Let z " " volume of the reducing liquid.

$$z = \frac{av - vB}{b - a}$$

TO CHANGE FROM TWADDLE TO SPECIFIC GRAVITY,

OR

TO CHANGE FROM SPECIFIC GRAVITY TO TWADDLE.

In order to change degrees Twaddle into specific gravity, multiply by 5, add 1,000, and divide by 1,000. *Example:* Change 168° Twaddle into specific gravity.

$$\begin{array}{r} 168 \times 5 \\ \hline 840 \\ 1,000 \\ \hline 1,000) 1,840 \\ \hline 1.84 \text{ Spec. Grav.} \end{array}$$

To change specific gravity into degrees Twaddle, multiply by 1,000, subtract 1,000, and divide by 5. *Example:* Change 1.84 specific gravity into degrees Twaddle.

$$\begin{array}{r} 1.84 \times 1,000 \\ \hline 1,840 \\ 1,000 \\ \hline 5 \) \ 840 \\ \hline 168^\circ \text{ Tw.} \end{array}$$

The degrees of Twaddle's hydrometer are easily turned into specific gravity numbers—a quality which makes it preferable to any other hydrometer in use. The rule is to multiply the indicated degree by 5, and add 1,000 to the product; for example, 9 degrees Twaddle equals specific gravity 1,045; 25 degrees Twaddle equals specific gravity 1,125; 100 degrees Twaddle equals specific gravity 1,500; and so on. To bring specific gravity numbers to degrees of Twaddle, subtract 1,000, and divide the remainder by 5; for example, specific gravity 1,100 equals 20 degrees Twaddle.

WATER ANALYSIS.

Analyses of water are sometimes reported as parts per million, and sometimes grains per imperial gallon, and sometimes grains per United States gallon. The following table gives all three values:

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
1	0.0700	0.0583	13	0.9100	0.7581
2	0.1400	0.1166	14	0.9800	0.8165
3	0.2100	0.1749	15	1.0500	0.8747
4	0.2800	0.2332	16	1.1200	0.9330
5	0.3500	0.2915	17	1.1900	0.9914
6	0.4200	0.3499	18	1.2600	1.0497
7	0.4900	0.4082	19	1.3300	1.1080
8	0.5600	0.4665	20	1.4000	1.1663
9	0.6300	0.5248	21	1.4700	1.2246
10	0.7000	0.5831	22	1.5400	1.2829
11	0.7700	0.6414	23	1.6100	1.3413
12	0.8400	0.6998	24	1.6800	1.3996

TABLES.

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Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
25	1.7500	1.4579	63	4.4100	3.6740
26	1.8200	1.5162	64	4.4800	3.7323
27	1.8900	1.5745	65	4.5500	3.7909
28	1.9600	1.6329	66	4.6200	3.8489
29	2.0300	1.6912	67	4.6900	3.9073
30	2.1000	1.7495	68	4.7600	3.9656
31	2.1700	1.8078	69	4.8300	4.0239
32	2.2400	1.8661	70	4.9000	4.0822
33	2.3100	1.9244	71	4.9700	4.1405
34	2.3800	1.9828	72	5.0400	4.1988
35	2.4500	2.0411	73	5.1100	4.2575
36	2.5200	2.0994	74	5.1800	4.3155
37	2.5900	2.1577	75	5.2500	4.3738
38	2.6600	2.2160	76	5.3200	4.4321
39	2.7300	2.2745	77	5.3900	4.4904
40	2.8000	2.3327	78	5.4600	4.5488
41	2.8700	2.3910	79	5.5300	4.6071
42	2.9400	2.4493	80	5.6000	4.6654
43	3.0100	2.5076	81	5.6700	4.7237
44	3.0800	2.5659	82	5.7400	4.7820
45	3.1500	2.6243	83	5.8100	4.8403
46	3.2200	2.6826	84	5.8800	4.8987
47	3.2900	2.7409	85	5.9500	4.9570
48	3.3600	2.7992	86	6.0200	5.0154
49	3.4300	2.8575	87	6.0900	5.0736
50	3.5000	2.9129	88	6.1600	5.1319
51	3.5700	2.9742	89	6.2300	5.1903
52	3.6400	3.0325	90	6.3000	5.2486
53	3.7100	3.0908	91	6.3700	5.3069
54	3.7800	3.1491	92	6.4400	5.3652
55	3.8500	3.2074	93	6.5100	5.4235
56	3.9200	3.2658	94	6.5800	5.4818
57	3.9900	3.3241	95	6.6500	5.5402
58	4.0600	3.3824	96	6.7200	5.5985
59	4.1300	3.4407	97	6.7900	5.6568
60	4.2000	3.4990	98	6.8600	5.7151
61	4.2700	3.5573	99	6.9300	5.7734
62	4.3400	3.6157	100	7.0000	5.8318

TABLE OF PRINCIPAL ATOMIC MASSES.

Name.	Symbol.	Atomic Mass.	Name.	Symbol.	Atomic Mass.
Aluminum.....Al		27.00	Lithium.....Li		7.02
Antimony.....Sb		120.00	Magnesium....Mg		24.30
Arsenic.....As		75.00	Manganese....Mn		55.00
Barium.....Ba		137.00	Mercury.....Hg		200.00
Bismuth.....Bi		208.00	Molybdenum..Mo		96.00
Boron.....B		11.00	Nickel.....Ni		58.70
Bromin.....Br		79.95	Nitrogen.....N		14.03
Cadmium.....Cd		112.00	Oxygen.....O		16.00
Calcium.....Ca		40.00	Phosphorus....P		31.00
Carbon.....C		12.00	Platinum.....Pt		195.00
Chlorin.....Cl		35.45	Potassium.....K		39.11
Chromium.....Cr		52.10	Silicon.....Si		28.40
Cobalt.....Co		59.00	Silver.....Ag		107.92
Copper.....Cu		63.60	Sodium.....Na		23.05
Fluorin.....F		19.00	Strontium.....Sr		87.60
Gold.....Au		197.00	Sulfur.....S		32.06
Hydrogen.....H		1.00	Tin.....Sn		119.00
Iodin.....I		126.85	Tungsten.....W		184.00
Iron.....Fe		56.00	Vanadium.....V		51.40
Lead.....Pb		206.95	Zinc.....Zn		65.41

PRONUNCIATION AND ORTHOGRAPHY OF CHEMICAL TERMS.

ADOPTED BY THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE IN 1891.

alū'minum.	chrō'mium.	nī'trogen.
a'ntimony.	cō'balt.	ō'xygen.
a'rsenic.	co'pper.	phōs'phorus.
bā'rium.	flū'orin.	plā'tinum.
bi'smuth (biz).	hŷ'drogen.	potā'ssium.
bō'ron.	ī'odīn.	sī'licon.
brō'mīn.	iron.	silver.
cā'dmium.	lead.	sō'dium.
cā'lcium.	magnē'sium (zhium).	strō'ntium (shium).
ca'rbon.	ma'nganese (eze).	sŷ'lfur.
cō'tium.	me'rcury.	tin.
cē'sium.	mōly'bdenum.	vānā'dium.
chlō'rīn.	nŷ'ckel.	zinc.

TERMINATIONS IN *-id* (FORMERLY *-ide*).

The final *e* is dropped in every case and the syllable pronounced *id* as chlō'ríd, r'odíd, hŷ'dríd, ō'xíd, hŷdrō'xíd, sŭ'lfíd, ā'míd, ā'nílíd.

TERMINATIONS IN *-ane*, *-ene*, *-ine*, AND *-one*.

The vowel of these syllables is invariably long, as mě'thāne, ě'thāne, na'phthalēne, a'nthracēne, prō'pīne, quí'nōne, ā'cetōne, kē'tōne.

MISCELLANEOUS WORDS.

Note the spelling : albumen, albuminous, albumiferous, asbestos, gramme, radical, appara'tus (sing. and plu.) Fāte, fāt, fār, mēte, mēt, pīne, pīn, marīne, nōte, nōt, mōve, tūbe, tūb, rúle, mŷ, ŷ=ŷ.

PART II.—GLOSSARY.

ABBREVIATIONS.—AmOH for ammonia; BaCl₂ for barium chloride; CO₂ for carbonic acid; CuSO₄ for copper sulphate or bluestone; FeSO₄ for copperas; HCl for muriatic or hydrochloric acid; HNO₃ for nitric acid; H₂O for water; H₂S for sulphuretted hydrogen; H₂SO₄ for sulphuric acid; KOH for caustic potash; NaCl for common salt; NaOH for caustic soda; Na₂CO₃ for carbonated soda; Na₂SO₄ Glauber salts; NH₄OH for ammonia; NH₄HS for ammonium sulphhydrate; NO₂ for nitrogen oxide; SO₂ for sulphur dioxide.

Acid, Acetic.—CH₃.COOH, or C₂H₄O₂ (Germ.: *Essigsäure*; conc.: *Eisessig*; fr.: *Acide acétique, vinaigre radical*). Synonyms: Wood vinegar, wood acid, pyroligneous acid, tar acid, acetous acid, *acidum aceticum*. Apt impurities are sulphates, chlorides, lead, copper, zinc, iron, and lime. It ought to be colorless, and should evaporate entirely; the hydrometer is not a reliable mode of proof of strength. The determination of the value should be made by titrating with a standard alkali, using phenolphthalein as the indicator.

Acid, Carbolic.—C₆H₅.OH, or C₆H₆O (Germ.: *Carbolsäure*, *Phenylsäure*; fr.: *Acide carbolique*). Synonyms: Phenol, phenic acid, phenyl alcohol; is noted for its antiseptic and disinfecting properties.

It has an extremely limited use in the dye-house, where it is sometimes employed to prevent decomposition. It is one of the products of coal-tar, and a dangerous poison.

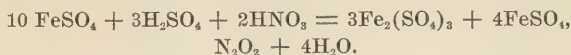
Acid, Citric.—C₃H₄(OH)(CO₂H)₃, or C₆H₈O₇ (Germ.: *Citronensäure*; fr.: *Acide citrique*). Apt impurities are tartaric acid and sulphuric acid. Citric acid should evaporate clean.

Acid, Lactic.—C₂H₄(OH)CO.OH, or C₃H₆O₃ (Germ.: *Milchsäure*; fr.: *Acide lactique*). Apt impurities are chlorides, nitrates, sulphates, acetic acid, butyric acid. It is well to make an ash determination. Test should also be made for glycerine and glucose.

Acid, Muriatic.—HCl (Germ.: *Salzsäure*, *Chlorwasserstoff-säure*; fr.: *Acide muriatique, chlorhydrique, hydrochlorique, esprit de sel marin, acide marin*). Synonyms: Hydrochloric acid, spirits of salt, marine acid. Apt impurities are sulphuric

acid, sulphurous acid (test by adding zinc and noting escape of sulphuretted hydrogen), free chlorine, ferric chloride (test with ammonia sulphocyanate), and arsenic. Common salt is sometimes added to raise the specific gravity of a weak acid. It is very readily detected by putting a little of the suspected acid in a saucer, and evaporating it. Sulphurous acid may be detected by a few particles of tin: if sulphurous acid were present, the offensive odor of sulphuretted hydrogen would be perceptible. Dilute is 1:3.

Acid, Nitric.— HNO_3 or NO_2OH . (Germ.: *Salpetersäure*; fr.: *Acide nitrique, esprit de nitre*). Synonyms: Aqua fortis, strong water, double aqua fortis. The coloration of ordinary nitric acid is due to the oxides of nitrogen. Apt impurities: Look for H_2SO_4 and HCl . The test for nitric acid is: Pour some H_2SO_4 , conc. and c. p., upon the suspected substance in a dry test-tube; see that the mixture is cool, and then gradually add a concentrated solution of ferrous sulphate, so that it lies upon the sulphuric acid but does not mix up with it; a ring forming at the point of contact between the two layers is violet-red or brown, according to the amount of nitrate originally present. The reaction is:



To detect free HNO_3 in the presence of a nitrate, evaporate the solution in a water bath with white wool, which will be turned to yellow. Dilute is 1:2.

Acid, Nitrous.— HNO_2 or NO.OH . (Germ.: *Salpetrige Säure*; fr.: *Acide nitreux, azoteux*). To test for: Make a saturated solution of sulphanilic acid, and a saturated solution of naphthylamine hydrochloride. Mix the two solutions and add to the suspected liquid, when a brown color will show the presence of NO_2 .

Griess's reagent for nitrous acid is a 0.5 per cent. solution of m-phenylenediamine with a small amount of sulphuric acid. If the solution was not colorless, it should be decolorized with animal charcoal. The test yields a yellowish-brown color if traces of nitrous acid were present.

A solution of sulphanilic acid and naphthylamine sulphate is colored red by traces of nitrous acid. The solution to be tested is acidified with sulphuric acid, sulphanilic-acid solu-

tion added, and, after a few minutes, a small quantity of solution of naphthylamine sulphate decolorized by animal charcoal.

Acid, Oxalic.— $\left\{ \begin{array}{l} \text{CO.OH} \\ \text{CO.OH} \end{array} \right\}$ or $\text{C}_2\text{O}_2(\text{OH})_2$, or $\text{C}_2\text{H}_2\text{O}_4$ (Germ.: *Oxalsäure*; fr.: *Acide oxalique*).

It can be obtained by the action of nitric acid upon sugar and starch, and is prepared on a large scale by treating sawdust or spent dye-woods with alkalis. Oxalic acid forms colorless transparent prismatic crystals, which have the specific gravity 1.64, are inodorous, intensely and unpleasantly sour, and do not grow moist on exposure. If they become damp, some nitric or sulphuric acid used in the preparation has not been thoroughly removed. It is soluble in its own weight of boiling water, but requires eight times its weight of water at 60° F. To detect sulphuric acid, dissolve in pure water, and add first pure hydrochloric acid, and then chloride of barium. If the oxalic acid is pure, the liquid will remain clear, but if there be an impurity of sulphuric acid, a white turbidity will appear. To detect organic impurities, heat a portion with concentrated sulphuric acid. If any such matter be present, a small quantity of extract of indigo, boiled along with the solution of the sample, will have its color destroyed. If iron, lime, potash, or soda be present, a portion of the acid, heated to redness, will leave a fixed residue.

Acid, Pyroligneous.—(Germ.: *Holzessig*, *Holzsäure*; fr.: *Acide ligneux*, *lignique*, *vinaigre de bois*.) Synonyms: Black liquor, wood vinegar—is the crude acetic acid. Acetate of lime, when distilled with phosphoric acid, gives off the acetic acid in shape to be directly titrated with phenol-phthalein; the distillation had best be repeated three or four times.

Acid, Sulphuric.— H_2SO_4 or $\text{SO}_2 \begin{array}{l} \text{OH.} \\ \text{OH.} \end{array}$ (Germ.: *Schwefelsäure*; fr.: *Acide sulfurique*, *sulfacide*, *huile de vitriol*).

Synonyms: Oil of vitriol, oil of sulphur. Manufacturers have adopted as "oil of vitriol" an acid which holds 93.5 per cent. H_2SO_4 . Normal is 49 gr. per liter. Its test is BaCl_2 —heavy white precipitate. Impurities are: Nitrogen oxides, tested for by diluting somewhat, adding diphenylamine, which develops a blue; or nitrogen peroxide, by adding the acid, very much diluted, to a solution of potassic iodide and starch paste;

or conc. solutions of copperas and sulphuric acid. For calcium, iron, and arsenic, evaporate to dryness first; then, for iron, dissolve in nitric acid and add yellow prussiate of potash. For arsenic, use Marsh's test, or Reinsch's, which latter should be used in presence of SO_2 or NO_2 . Examine for lead, which falls as a milky precipitate (PbSO_4) when the acid is diluted. Dilute sulphuric is 1: 5.

Acid, Sulphurous.— $\text{SO}_2 \begin{smallmatrix} \text{H} \\ \diagup \\ \text{OH} \end{smallmatrix}$ or H_2SO_3 (Germ.: *Schweflige Säure*; fr.: *Acide sulfureux*). A product of the combustion of sulphur. Cold water dissolves over 30 times its volume of sulphurous oxide; the solution contains hydrogen sulphite, or sulphurous acid, and may be kept unchanged so long as air is excluded. Excess of oxygen alters sulphurous into sulphuric acid.

Acid, Tannic.—(Germ.: *Gerbsäure*; fr.: *Acide tannique*.) The only reliable method of estimating tannic acid goes under the name of hide-powder method, and success depends upon the quality of the hide-powder.

Acid, Tartaric.— $\left\{ \begin{array}{l} \text{CH (OH). COOH:} \\ \text{CH (OH). COOH.} \end{array} \right\}$ or $\text{C}_4\text{H}_6\text{O}_6$. (Germ.: *Weinsäure, Weinsteinssäure*; fr.: *Acide tartrique, tartarique*). Synonym: Di-hydroxy-succinic acid. Impurities are lead, copper, iron, lime, sulphates, and bisulphate of potash. Good tartaric acid should evaporate white. The aqueous solution should not effervesce with nitric acid, as that would show carbonates. Test the nitric acid solution with baric chloride for sulphates, with silver nitrate for chlorides, and with ammonia and ammonium oxalate for lime.

Albumen.—(Germ.: *Eiweiss, Eiweissstoff*; fr.: *Albumine*.) Precipitated by alcohol, corrosive sublimate (bichloride of mercury), solutions of lead, silver, and copper, acetic and muriatic acids, creosote, etc., but not by tannin, which latter will precipitate gelatine; thus discriminate between them. Solutions keep better when sodic arseniate is added. Turpentine oil is said to whiten dark-colored grades. Albumen is soluble in cold, but insoluble in hot water; at about 140°F . it coagulates. It takes the whites of ten dozen eggs to make a pound of albumen.

Blood Albumen has much the same properties as egg-albumen, but, unlike egg-albumen, is not coagulated by shaking

with ether. It occurs in blood-serum. Care must be taken in its manufacture, otherwise the red corpuscles will break and spoil the color of the product.

Alcohol.—(Germ.: *Alkohol*, if rectified, *Weingeist*; fr.: *Alcool*.) Ethyl-alcohol ($C_2H_5.OH$ or C_2H_5O) is the ordinary alcohol of commerce. Synonyms: Spirit of wine, aqua vitæ, grain alcohol. Methyl-alcohol ($CH_3.OH$ or CH_4O), or wood-alcohol, wood-naphtha, is a lower homologue. Apt impurities: Sugar, extractive matter, turpentine, coal-naphtha, pyroligneous and fusel oil. To detect the sugar, extractive matter, or turpentine, the best method is to distil a portion and take the specific gravity again. Fusel oil can be detected by its characteristic odor on rubbing some of the alcohol in the palms of the hands. Methyl-alcohol should not cloud on mixing with water, must remain colorless on addition of sodium hydrate, and when sulphuric acid is added it must turn, at most, only a weak yellow. Acetone should be looked for.

Alcohol, Aldehydes in.—(Germ.: *Aldehyd*; fr.: *Aldéhyde*.) *Guyon's reagent for:* Dissolve 1 gr. fuchsine in 1 liter water, and add a mixture of 20 cc. sodium-bisulphite solution of 30 Bé. and 10 cc. concentrated hydrochloric acid. One cc. of this reagent added to 2 cc. of the solution to be tested will show the presence of aldehyde by the formation of an intensely purple-red reaction. This reagent is also known as "Schiff's reagent."

Alcohol, Acetone in.—*Gunning's test for:* Add to the solution to be tested tincture of iodine and ammonia; iodoform and a black precipitate of nitrogen iodide are formed, the latter gradually disappearing and the yellow color of the iodoform persisting. Alcohol by this treatment produces no iodoform.

Alkali. See **Soda Ash**.

Alkanet.—(Germ.: *Alkannawurzel*, *Ochsenzungenwurzel*; fr.: *Orcanette*.) The root of *Anchusa tinctoria*. Used for coloring ointments, cheeses, and pomades.

Alkermes. See **Kermes**.

Alligin.—Different species of plant glue.

Alum.—(Germ.: *Alaun*; fr.: *Alun*.) The difference between the different kinds of alums found in the trade will be best shown by giving a tabular view of three of the more ordinary alums found in the trade:

	COMMON OR POTASH-ALUM.	AMMONIA- ALUM.	SULPHATE OF ALUM.
	$\text{Al}_2(\text{SO}_4)_3$ + K_2SO_4 + $24\text{H}_2\text{O}$.	$\text{Al}_2(\text{SO}_4)_3$ + $(\text{NH}_4)_2\text{SO}_4$ + $24\text{H}_2\text{O}$.	$\text{Al}_2(\text{SO}_4)_3$.
Alumina.....	10.8	11.4	15.5
Potassium.....	10.0	—	—
Ammonium.....	—	3.8	—
Sulphuric Acid.....	33.8	35.3	36.0
Water	45.5	50.0	48.6

$\text{Al}_2(\text{SO}_4)_3 + 18\text{H}_2\text{O}$ is "cake alum," "concentrated alum," or "patent alum": obtained from cryolite and bauxite. Iron is the most harmful impurity. A mixture of the ferrocyanide and ferricyanide of potassium may be added to the solution of a portion of the alum. An immediate blue precipitate shows the presence of iron. On longer standing, as, *e.g.*, for an hour, this mixture may produce a blue precipitate even in pure alum. Tincture of galls, or a solution of tannin in any form, will produce a black color in the solution of alum, if iron be present. Alum gives acid reaction with litmus and phenol-phthalein, but not with methyl orange, unless some free acid is present. Alums of potash and ammonia are used interchangeably in industries; the soda-alum is extremely soluble in water, and for this reason it is about impossible to separate it from ferrous sulphate by crystallization.

Alum, Calcined.—Although good modern alum cannot be benefited by calcining, an inferior or an impure alum would be improved. The heat would have a tendency to render the iron in an impure alum insoluble in water by expelling a portion of the acid with which it was combined; if the alum was also of a very acid nature, some of the excess of acid would also be removed and its quality improved.

Amidon Grillé.—Synonym for brown dextrines.

Ammonia.— NH_4OH , or AmOH , or $\text{NH}_3\cdot\text{H}_2\text{O}$. (Germ.: *Ammoniak*; fr.: *Alcali volatil*, *ammoniaque*). Synonyms: Harts-horn, volatile alkali. Apt impurities are chlorides, carbonates, sulphides, iron or lead compounds, lime and tarry substances. Rub a little of the ammonia on the palm of the hand; if there were empyreumatic oil in the sample, the odor will betray it. The test can also be made by adding slowly a large excess of concentrated sulphuric acid, which chars the organic matter and gives a black color to the liquid. Ammonia should vola-

tilize completely, and not evolve a disagreeable odor on the addition of acid. The usual test for ammonia is the *Nessler test*. The reagent is made by dissolving 2 gr. potassic iodide in 5 cc. of water, warming and adding iodide of mercury as much as can be dissolved, cool and add 20 cc. H_2O , let settle, and filter, and to 20 cc. of the liquid add 30 cc. of concentrated caustic soda c. p. A trace of ammonia produces with this reagent a yellowish-brown precipitate.

Ammonium Sulphide.— $(NH_4)_2S$ or Am_2S . (Germ.: *Schwefelammonium*, *Ammoniumsulfid*; fr.: *Sulfure d'ammoniaque*). Is prepared by saturating three parts of ammonia with H_2S , diluting this solution with two parts of $AmOH$, when a sulphide is obtained which contains a little free ammonia.

Aniline Dyes.—(Germ.: *Anilinfarben*; fr.: *Teintures d'aniline*.) To test for dextrine, Glauber's salts, sugar, starch, sulphate of magnesia, and zinc oxid, dissolve in alcohol or ether, and observe amount insoluble—dextrine, starch, Glauber's salts. Dissolve in water and evaporate to dryness, when the crystals of Glauber's salts will form in large size. Dissolve in water and allow to settle, and after two or three days see how much deposition there has been. Steam the dye and observe if it gets sticky, indicating starch. Place in the sun or on the stove for a while; this will remove water of crystallization from Glauber's salts, leaving the crystals white, when they can be readily seen.

Mixtures of aniline dyes can be best shown by dusting a very little on to filter-paper which has been moistened. On account of the different rates of solubility; the components of the mixture will separate; a similar experiment can be made by dusting a little of the aniline dye on to a beaker nearly full of water. As the particles fall down through the water, they will separate and can be easily recognized.

Aniline Oil (Germ.: *Anilinöl*; fr.: *Huile d'aniline*) should dissolve completely in hydrochloric acid or sulphuric acid, and the boiling point should not be changed by treatment with caustic soda. To determine the proportion of aniline and toluidine in an oil boiling between 185° and $205^\circ F.$, take a known weight and treat it with one-half per cent. oxalic acid dissolved in water. Boil, and when dissolved cool down to $80^\circ F.$, stirring continually. The greater part of the oxalate of toluidine precipitates; decant rapidly, throw the precip-

itate into a cheese-cloth, and squeeze out all excess. Then decompose this by ammonia containing enough alcohol to maintain in limpidity, heat, and when the solution cools the toluidine will crystallize out.

Anotto.—(Germ.: *Orlean*; fr.: *Rocou, roucou, anotto*.) Synonyms: Anotta, annatto, anoto, arnotto. Used in silk dyeing, and very rarely cotton, as it is a loose color. It is a pulp or paste, like putty, sometimes a solid cake, red inside, but brown on the exterior. Comes wrapped in large leaves. From seeds of *bixa orellana*, a South American shrub. In practice it is mixed with an alkali, since it is not soluble in water. Apt adulterants are brick-dust, red ochre, and iron oxide. The coloring principle is bixina, a red; another coloring matter is orelline, which is yellow.

Antichlor.—An agent for removing last traces of chlorine from goods. Bisulphite of soda, hyposulphite of soda, sulphurous acid, and ammonia have been used.

Antimonium.—A new antimony mordant, to replace tartar emetic.

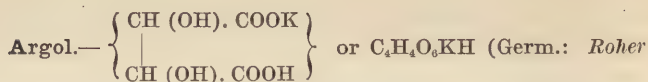
Apparatine.—One of the numberless preparations of starch made by the treatment of flour and starch with caustic or carbonated alkalis.

Aqua Fortis. See Nitric Acid.

Aqua Regia.—(Germ.: *Königswasser*; fr.: *Acide azotique, eau forte*.) Three parts muriatic acid, and one part nitric acid. Synonyms: Nitromuriatic acid, azotic acid, nitrohydrochloric acid.

Arabil.—Different species of plant glue.

Archil.—(Germ.: *Orseille, Färberflechte*; fr.: *Orseille*.) Synonym: Orchil. This is a coloring principle prepared from a kind of moss, *Rocella tinctoria, variolaria orcina, lichen coral-lenus*, growing on rocks and stones, commonly called a lichen. The lichen has no color of itself, but by fermentation and treatment with lime and ammoniacal fluids, as urine, the coloring matter is developed. Archil has a peculiar characteristic smell, and was at one time used in silk and woolen dyeing to obtain different colors. Cudbear and litmus are very similar to archil. It is to-day almost entirely substituted by the aniline dyes.



Weinstein; fr.: *Tartre brut*). When purified it is called "Cream of Tartar," or simply "Tartar" (Germ.: *Weinstein-rahm*, *Cremor Tartari*; fr.: *crème de tartre*). In its crude state it is either red or white argol, according as it has been deposited during the fermentation of red or white wine. Grape-juice, allowed to stand, deposits a crystalline layer upon the sides of the barrels. This is potassium bitartrate, and in commerce it is known under the name of argol. It is properly classed as one of the assistants in dyeing. The crystals, when shaken together, ring like fragments of earthenware. As it is relatively high-priced, many substitutes have been suggested, which generally consist of mixtures containing oxalic acid, bisulphate of potash, alum, common salt, etc. "Super-argol" is said to be a mixture of white argol and sulphuric acid. Apt adulterations of argol are organic matter, sand, carbonates, sulphates, chlorides, and lime. The latter from "plastered" wine. Look for starch also.

The best quality of argols is taken from the sides of barrels, and not from the bottom.

The sodium-potassium salt ($\text{C}_4\text{H}_4\text{O}_6\text{KNa} + 4\text{H}_2\text{O}$) is known as *Rochelle* or *Seignette Salt* (Germ.: *Seignette Salz*; fr.: *Sel de seignette*), and used in medicine.

Arsenates or Arseniates.—(Germ.: *Arsensaure Salze*; fr.: *Arseniates*.) **Arsenate of Potash.**— $\text{K}_2\text{HAsO}_4 + 12\text{H}_2\text{O}$. (Germ.: *Arsensaures Natrium*; fr.: *Arsenate de potasse*). Formerly used as a resist in combination with pipe-clay.

Arsenate of Soda.— $\text{Na}_2\text{HAsO}_4 + 12\text{H}_2\text{O}$ (Germ.: *Arsensaures Natrium*; fr.: *Arsenate de soude*). This product is largely used in calico-printing as a dung-substitute in clearing the cloth after mordanting, to remove the excess of unfixed mordant.

Arsenic Tests.—Some simple tests are: A gas-jet is turned down to quite a pin-point, until the flame is wholly blue; then the suspected sample is brought into contact with the outer edge of the gas flame, and a bluish-white coloration, due to arsenic, will be seen in the flame (test No. 1). The fumes that are given off will be found to have a strong garlic-like odor, due to the vapor of arsenic acid (test No. 2).

Another test for arsenic is *Gutzeit's test*: The substance to

be tested, together with c. p. zinc and c. p. dilute sulphuric acid, is placed in a test-tube, the mouth of which is closed with a piece of filter-paper moistened with a few drops of a silver-nitrate solution. The arseniuretted hydrogen formed if arsenic is present produces a yellow spot on the paper, which is blackened upon moistening with water.

The usual method of testing for arsenic is *Marsh's test*, which is made by developing arseniuretted hydrogen; this is burned and a piece of cold porcelain is inserted in the flame, when a metallic mirror deposits on the plate.

Antidotes in Cases of Arsenic Poisoning.—Emetics, such as warm mustard-water (one teaspoonful of mustard in a glass of water), or a quantity of soap-suds. Also milk, the whites of eggs, or freshly precipitated ferric hydrate ($\text{Fe}_2\text{H}_6\text{O}_6$).

Bark (*See Quercitron Bark*).—The term bark is generally used to designate quercitron bark. The barks from other trees have been used as dyes, but the word "bark" is almost exclusively limited to quercitron. Alder bark, oak bark, pomegranate bark, pine bark, and willow bark are all historical dyes, and cut no figure in practical applications.

Barwood.—A red dyewood from Africa, closely resembling sandal-wood. Its coloring-matter is not easily extracted by water, for boiling only dissolves a small quantity of it, and this precipitates in great part as the water cools; there is, therefore, no barwood liquor or extract. To dye with it, the rasped or ground wood has to be used just as madder is used in madder-dyeing. The goods take the color from the water as fast as it takes it from the wood; the coloring-matter is gradually transferred until the desired shade is obtained or the wood spent. It produces a good imitation of the Bandana Red, but it requires a very skillful dyer to get a good result. It was used for the production of "mock turkey red."

Benzene.— C_6H_6 . Synonyms: Benzol, coal-tar naphtha. It is better to use the name benzol, as that distinguishes it clearly from benzine, a product from the petroleum industry.

Berries.—(Germ.: *Gelbbeeren*, *Avignonkörner*; fr.: *Graines d'Avignon*.) Synonyms: Persian berries, French berries. There are about seven or eight different qualities, all derived from the same kind of shrub, *Rhamnus infectoria*, in France called the dyer's buckthorn; it grows in France, the island of Candia,

Wallachia, and Asia Minor. One variety grows in Persia, whence its name.

Bicextine.—A sizing material made by malt process to a dextrin.

Bichrome or Bichromate of Potash or Soda.—Synonym: Chrome. Rarely sophisticated.

Bichrome of Potash.— $K_2Cr_2O_7$ (Germ.: *Kaliumbichromat*; fr.: *Bichromate de potasse*).

Bichrome of Soda.— $Na_2Cr_2O_7$ (Germ.: *Natriumbichromat*; fr.: *Bichromate de soude*).

Bichrome, used for mordanting, should be 3 per cent., calculating on the weight of the goods, and tartar, 2 per cent. Sulphate of copper, 2 to 3 per cent., is advantageous. Apt impurities: Sulphates.

Blanc Fixe.—Trade name for barium sulphate. Used in sizings for weighting and filling the goods.

Bleaching Powder.—Synonym: Chlorinated lime. *U. S. P. Method for Estimating Chlorinated Lime.*—If 0.354 gramme of chlorinated lime be thoroughly triturated with 50 cc. of water and carefully transferred, together with the washings, into a flask, and then 0.8 gr. of iodide of potassium and 5 cc. of diluted hydrochloric acid added, the reddish-brown liquid, mixed toward the end of the titration with a few drops of starch, test solution, should require, for complete decoloration, not less than 35 cc. of decinormal sodium hyposulphite solution, and each cc. corresponds to 1 per cent. of available chlorine.

Blue Stone. See Copper Sulphate.

Borax, Borate of Soda.— $Na_2B_4O_7$ (Germ.: *Tetra (saures) borsaures Natron, Tinkal*; fr.: *Borax, biborate de soude, soude boratée*). A few years ago the main source was Tuscany, but now it is brought in large quantities from Nevada. It is little used in dyeing, but is used more or less in the woolen mills in connection with oil, in order to make emulsion for oiling the wool as it stands before the picker. "French borax powder" was a mixture of soda ash and lime.

Brazil Wood.—(Germ.: *Fernambuk, Fernambukholz, Brasilienholz, Rothholz*; fr.: *Bois de Brésil, Bois de Fernambouk, brésillet rouge de Brésil*.) Synonyms: Brazil, Pernambuco-wood, Red-dye-wood. This is a red wood, *Cæsalpina crista*, and, as its name indicates, comes from Brazil. It can be distinguished from barwood by the fact that it speedily gives a

bright-red color to water. Sandal-wood and barwood do not, under similar circumstances, color water. Apt adulterations are common salt and nitrate of soda. Liquor should be heated with some nitric acid until the color is destroyed, then the residual liquor should be mixed with distilled water and a solution of silver nitrate should be added. It is from the same kind of tree and nearly identical with peachwood, Lima-wood, and sapan-wood. The richest variety is from Pernambuco, and is sometimes called Pernambuco-wood. Owing to the fugitive character of the color, it is being less and less used.

Brillantkleister.—Different species of plant glue.

Camwood.—(Germ.: *Cambalholz*, *Angolaholz*, *afrikanisches Rothholz*; fr.: *Bois de cham*, *bois d'Angole*.) Synonyms: Kambe-wood, Angola-wood. This is the wood of *Baphia nitida*, obtained from the west coast of Africa, and has about the same properties as Brazil-wood. Like other dye-woods, it is steadily decreasing in application.

Canaiigre.—A tuberous root (*Rumex hymenosepalus*) being increasingly cultivated in the Southwestern parts of the United States and in Mexico, and used for the tannin which it contains.

Caseine.—(Germ.: *Casein*, *Käsestoff*; fr.: *Caséine*, *caséum*.) Curd milk, sold as a powder under the name of lactarine. It is prepared by precipitating skimmed milk with dilute acids. It is insoluble in pure water, and must be dissolved by solutions of ammonia and borax, the latter being preferred on account of its antiseptic properties. It is used in calico-printing as a substitute for albumen. It is not coagulated by steaming, and can only serve for colors requiring a moderate degree of fastness. It is distinguished from albumen by the circumstance that it does not become insoluble when heated in diluted solutions.

Catechu.—(Germ.: *Catechu*, *japanische Erde*; fr.: *Cachou*, *terre du Japon*.) Synonyms: Cutch, Japan earth, terra Japonica, kut, cashew. Bombay catechu is prepared from the wood and fruit of the catechu palm, *Areca catechu*. Bengal catechu is made from the twigs and unripe pods of *Mimosa catechu*. Gambier catechu, also called Cubical and Yellow Catechu, is obtained from the leaves of the shrub *Uncaria gambier*, and occurs in commerce in the form of small cubes.

Good catechu should not contain more than 5 per cent. ash, or more than 12 per cent. of matter insoluble in boiling alcohol.

Its texture is resinous, and, if good, sufficiently brittle to break under the hammer. The color, however dark outwardly, should be a brownish cream color within. If it is deep-brown throughout, and soft and pitchy in consistence, so as to cling to a knife, it has become impaired in quality either by long keeping or by exposure to moisture. It should contain about half its weight of tannin, varying in this point from 37 to 56 per cent.

Catechu is entirely soluble in hot water, if genuine. The brown solution, when cold, lets fall a sediment, containing the bulk of the catechuic acid.

Catechu is frequently adulterated with clay, sand, starch, ochre, etc. The detection of these impurities is very easy. The sample is boiled in alcohol and the decoction strained, when all such admixtures remain and may be dried and weighed. Blood or sugar may be detected by burning the admixture, when the characteristic odor betrays them.

Chemic.—Synonyms: Bleaching powder (which see), chloride of lime, and bleach. Bleaching powder is now made in this country with as high a per cent. of chlorine strength as the best grades of imported chemic.

Chinese Green (Lo-kao, Vert-Venus).—Prepared from the buckthorn, superseded by the aniline greens.

Clay.—(Germ.: *Thon*, *Lehm*; fr.: *Argile*, *glaise*.) Synonyms: Terra alba, kaolin, porcelain clay, China-clay, pipe-clay, Devonshire-clay, Cornish-clay, Argil. Sometimes used by the printers as resists, and they are abused for adulterating lake-colors and other pigments. China-clay is an hydrated silicate of alumina, and is obtained from orthoclase or felspar. It differs from porcelain in not possessing such strong affinity for water, which difference may be readily shown by testing with the tongue. The porcelain-clay absorbs water from the tongue and adheres to it, while China-clay will not. The tests are as follows:

1st. It must not grit between the teeth.

2d. It must have an unctuous feel, and should be compared with a standard by putting on a glass plate, adding a little water and rubbing each lot, the new and the old.

3d. Should not effervesce when muriatic acid is added.

4th. Color should be compared to standard.

5th. Avoid iron, which would alter the color. When boiling, add soap with tallow in order to check spattering.

Chlorophyll.—(Germ.: *Chlorophyll*, *Blattgrün*; fr.: *Chlorophylle*, *vert des feuilles*.) Synonym: Leaf-green. The green coloring-matter of the leaves. Insoluble in water. In the attempt made to use it as a dye, grass has been first boiled out in water, and the color extracted from the residue by a very weak lye of carbonate of soda, from which the chlorophyll is thrown down as a paste by the cautious addition of an acid. It has been experimentally used in dyeing and printing, but not with satisfactory results, as it is dull, fugitive, and very low in tinctorial power, and consequently expensive. *Xanthophyll* and *Erythrophyll* are yellow and red colors found in decaying leaves. They are of no practical importance.

Cochineal.—(Germ.: *Cochenille*, *Johannisblut*; see **Kermes**; fr.: *Cochenille*.) An insect, *coccus polonicus*, feeding on a species of cactus in Central America, *cactus opuntia*. The usual adulteration consists in adding some powdery matter to the cochineal, to increase its weight. French chalk, white lead, and ground talc are said to be chiefly used. These adulterations are easily detected upon analysis, for by calcining the mixture at a red heat, the true matter of the cochineal is burned away, leaving the added mineral adulteration, the quantity and nature of which can be then ascertained. The pure coloring-matter of cochineal has received the name of carmine.

Copperas.— $\text{FeSO}_4 + 7\text{H}_2\text{O}$ (Germ.: *Grüner Vitriol*, *Eisen-vitriol*; fr.: *Vitriol vert*, *couperose verte*). Synonym: Green vitriol. A name given to the protosulphate of iron, from the mistaken notion that it contains copper. If of a dull, whitish-green color—as it is technically called, milky—the presence of alumina is to be suspected. Add pure caustic soda—that prepared from metallic sodium to be preferred—in large excess; boil in a clean iron vessel and filter. Add to the clear filtrate a solution of pure sal ammoniac. If, on standing, a white precipitate appears, alumina was present in the copperas.

Lime is sometimes dusted over copperas to give that brown spotty appearance which some consumers prefer.

The direct uses of copperas in dyeing have very much diminished. For dyeing blacks upon wool in conjunction with

logwood it has been, to a very great extent, superseded by chrome. For blacks upon cotton, as also for saddening drabs, clarets, etc., the nitrate of iron is generally preferred.

Copper Sub-Acetate.— $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 + \text{CuH}_2\text{O}_2$ (basic copper acetate) (Germ.: *Grünspan*; fr.: *Verdet, vert-de-gris*). Synonyms: Verdigris and verditer. Apt impurities are chalk and sulphate of copper. Very poisonous. Antidote: Whites of eggs, milk, magnesia.

Copper Sulphate.— $\text{CuSO}_4 + 5\text{H}_2\text{O}$ (Germ.: *Kupfervitriol, blauer Gallitzenstein*; fr.: *Vitriol de cuivre, vitriol bleu, vitriol de Chypre*). Synonyms: Bluestone, Cyprus, Roman vitriol, blue vitriol, vitriol of copper, copper-vitriol. If it holds FeSO_4 , it is called Admont, mixed, Bayreuth (or Salzburg) vitriol. Admont vitriol: 5 parts FeSO_4 and 1 part CuSO_4 . Double Admont: 4: 1; Bayreuth, 7: 1; Salzburger, 17: $5\frac{1}{8}$ (also called Double Eagle vitriol).

Look for iron by boiling with a few drops HNO_3 , and then adding AmOH to dissolve the precipitated oxide of copper, which leaves then the iron behind as insoluble oxide. Look for zinc by first removing the iron by AmOH , and add $(\text{NH}_4)\text{HS}$.

Cudbear.—(Germ.: *Persio*; fr.: *Orseille de terre épurée, orseille violette*.) A modified extract of colorable lichens (*Lecanora tartarea, Lichen omphalodes, calcareus, saratilis*), similar in its behavior to archil. Its peculiar odor is easily remembered. Its use is confined to a few cases of silk dyeing. It is sometimes purposely contaminated with mineral matter, such as salt, carbonate of lime, etc. These frauds may be detected by burning a weighed quantity of the sample to ashes.

Cutch. See *Catechu*.—The test to distinguish between cutch and gambine is to dissolve in potash, and extract with benzine, when there will be a green fluorescence if gambine is present.

Delaine.—(Germ.: *Wollmousseline*; fr.: *Muslin de laine, mousseline de laine*.) Although these words in French distinctly indicate a fabric made of wool, they are employed in English to indicate a material of which the weft only is wool, the warp being cotton. In French this fabric is called *chaîne cotton*—that is, “cotton warp”; and sometimes *mi-laine*—that is, “half wool.”

Dextrine.— $\text{C}_6\text{H}_{10}\text{O}_5$ (Germ.: *Dextrin, geröstete Stärke, Stärk gummi*; fr.: *Dextrine*). Synonyms: British gum, artificial

gum, torrifed starch, starch-gum, Leiogomme. Apt impurities: Unconverted starch (tested for with iodine), grape-sugar, acids. Adulterations may be sand, plaster-of-Paris, sulphate of barium, and talc. The dextrine is dissolved in water, evaporated to a syrup, and then precipitated by alcohol. The glucose can be estimated by Fehling's test, but must be boiled only for a short time. Comparative experiments showing thickening power should be made. A quick method for testing is to mix it with cold water in a long test-tube; in the course of a few hours all the insoluble or imperfectly calcined and raw particles fall to the bottom of the test-tube and from their quantity the quality of the sample may be judged. Test for grit: If the lumps yield to pressure the residue is most likely charred particles of farina. It is one of the characteristics in dextrine that, when hard, it becomes thin, and grit will sink to the bottom; other gums are apt to keep the grit in suspension.

Brown Dextrines.—Synonyms: *Amidon grillé, gebrannte Stärke, Gomein, Gommeline, Lefèbregummi, Leiocomme, Leio-gomme.*

Diastase.—(Germ.: *Diastase*; fr.: *Diastase*). A peculiar substance contained in malted grain, and is used for removing starch sizing out of cloth, where a soft finish is demanded. One part of this active ferment is sufficient to change 2,000 parts of starch into dextrine and sugar.

Divi-Divi.—(Germ.: *Dividivi*; fr.: *Dividivi*.) Synonym: Libi-divi. This is an astringent substance from pods, *Poinciana coriaria*, possessing some of the properties of sumac; attempts were made to extend its use in dyeing, but not with much success; it is used by tanners, but scarcely, if at all, by the dyers or printers.

Egalisol.—This is borosulphate of soda. Three per cent. of egalisol is used with 4 per cent. of bichromate to even up the color.

Emeraldine, made from aniline and potassium chlorate.

Epsom Salts.— $\text{MgSO}_4 + 7\text{H}_2\text{O}$ (Germ.: *Bittersalz, Englisches Salz, Schwefelsaure Magnesia*; fr.: *Sel d'Epsom, epsomite, magnésie sulfatée, sel amer*). Synonym: Bitter salt. Used in certain finishes.

Erythrophyll. See **Chlorophyll**.

Farina.—(Germ.: *Kartoffelstärke*; fr.: *Fécule de pommes*

de terre.) Synonym: Potato-flour. This term is usually applied in trade to the starch obtained from potatoes, often called potato-starch.

Fehling's Solution.—This consists of two solutions, namely (a) an aqueous solution of copper vitriol, which contains in one liter 34.639 gr. crystallized copper sulphate, and (b) a solution which is prepared by dissolving in a liter flask 173 gr. sodium potassium tartrate, adding 572 gr. caustic soda of 1.12 sp. gr. (containing 60 gr. sodium hydroxide), and filling up to the mark.

Flavine.—The yellow or orange color obtained from quercitron bark. Apt adulteration is common salt.

Flour.—(Germ.: *Mehl*; fr.: *Farina*.) Chemically, flour may be considered a mixture of starch and a peculiar substance called gluten. It is the amount of starch that renders it more or less valuable. The gluten has no sensible thickening power of itself. The best and only test of any practical value is to make a trial of it in thickening, observing how much it takes to give a good consistent paste.

The principal adulterations are potato-starch and bean-flour, Indian-corn flour, rye- and rice-flour. Sometimes alum, chalk, bone-dust, and plaster. Moisture should be determined by drying in a water-bath until constant weight is obtained.

To detect potato-flour use a microscope. The particles of potato-starch are of various sizes; and, moreover, upon placing a little of the suspected flour before the microscope and moistening it with a solution of potash, the particles of wheat-flour undergo no change, while the granules of potato-starch spread into thin transparent plates. Test for alum with logwood, and for mineral matter by shaking with chloroform, and allowing to settle; the flour will float.

Flour Testing.—Soak 5 gr. of flour in 100 cc. cold H_2O , for a couple of hours with frequent stirring; toward night put into a filter; fill up the funnel with H_2O , and let it stand through the night. Residue holds cellulose, starch, gluten, and fat; the filtrate holds albumen, gum, and sugar. Boil the residue in 500 cc. H_2O containing 5 cc. H_2SO_4 , conc. until the iodine test is not given; then neutralize with NaOH solid, and titrate against 10 cc. Fehling's solution in 40 cc. H_2O at 100° Centigrade, and report as starch per 5 gr. Boil the solution and divide into two parts. The first half is titrated against

2 cc. of Fehling's solution in 40 cc. H_2O at 100° Centigrade, and report as sugar per $2\frac{1}{2}$ gr. The second half is acidified with H_2SO_4 dil., boiled until the iodine test is not given, neutralized with $NaOH$, and titrated against Fehling's solution without the addition of H_2O . Excess is cane-sugar, which is to be reported as cane-sugar per $2\frac{1}{2}$ gr.

If flour be mixed and kneaded in a cloth with water, a whitish liquid will be strained off, which, being left to settle, will deposit starch. The substance retained by the cloth is gluten, which is white and insoluble. A poor flour is merely slimy.

Special names for flour paste boiled with alkalis: *Polio-kolle*, *Schlichtepreparat*, *Apparatin*, *Gallerte*, *Krystall-Appretur*, *Pflanzenleim*, *Alligin*.

Fuller's Earth.—(Germ.: *Walkerde*; fr.: *Terre à foulon*, *glaise à dégraisser*, *argile smectique*.) A term originally applied to a lime or argillaceous earth occurring in association with chalk and oölite.

Fustet.—(Germ.: *Fisetholz*, *Visetholz*, *ungarisches Gelbholz*; fr.: *Fustet*.) Synonyms: Young fustic, Zante-fustic. Wood of a European tree, *Rhus cotinus*, obtained its prefix "young" on account of the smallness of its branches compared with that of the yellow wood, which was distinguished as "old" fustic. Its colors are more fugitive. Fustet is very little used in cotton-dyeing, not at all in calico-printing, but is used by some wool-dyers to give a more fiery tint to their scarlets.

Fustic.—(Germ.: *Gelbholz*; *Bois jaune*.) Synonyms: Cuban wood, old fustic, yellow wood. The wood of a tree (*Morus tinctoria*) formerly known as "*Dyer's Mulberry*." The colors it gives are not very stable. It comes into sale in four states; namely, as chips, powder, aqueous extract, and as a paste or lake.

In the two former states it is generally laid up for several weeks before coming into use, being frequently turned over and sprinkled with water. This process softens the woody fibre, and enables the color to be more easily extracted. Sometimes, however, the water is present in such amount as to constitute an adulteration. Samples both of chipped and rasped fustic, carefully dried at 212° F., have been known to lose not less than 48 per cent.

Fustic liquor, or extract of fustic, is water saturated at

212° F. with the coloring principles of fustic, and boiled down to 8° or 10° Twaddle. Like the other extracts, this liquor is often "sprung," as it is technically called; that is, mixed with some substance that may increase its weight, and cause it to mark a higher degree on the hydrometer. Common salt is generally selected on account of its cheapness, ready solubility, and from the fact that it does not very seriously modify the appearance of the liquid. Look for quercitron, chestnut, curcuma, starch, dextrine, molasses, glycerine, zinc salts, anilines, and alizarines.

Scheme for Fustics.

Report No.	Date.
Laboratory No.	Their Mark or No.
Ash (mineral):	
Water:	
Specific Gravity:	
Beaumé:	
Twaddle:	
Insolubles:	
Alkali:	
Alizarines:	
Resins:	
Glucose:	

Gall Nuts.—(Germ.: *Galläpfel*, *schwarze oder grüne*; fr.: *Noix de galle*, *galles noires-vertes*.) Synonyms: Nutgalls, oak apples. This valuable dyeing material is an excrescence from a certain tree (*Quercus infectoria*); it is caused originally by the puncture of a little insect (*Cynips quercus folii*, *Diptolepis gallæ tinctoriæ*) on the leaves, or small branches of the tree, in order to deposit its egg in the cavity formed. The juices of the tree collect round the egg, and, hardening, form the gall nut. If the larvæ have eaten out, there is a loss of astringent principle, and the nuts are then called green galls.

Gambier resembles catechu or cutch. It is obtained by extracting the leaves of the *Uncaria gambier*, a shrub growing abundantly in the Malage and India Islands. It contains varying amounts of a tannin known as catechu-tannic acid or mimotannic, and a white crystalline body called catechine or catechine acid. Apt impurities are clay and occasionally starch. Excess of mineral is determined by igniting a weighed amount in a crucible. A good cutch should not leave more than 3 per cent. of an ash. The percentage of water varies

from 15 to 25. The estimation of the amount of catechu-tannic acid is said to be of no value.

Garanceux.—A preparation of madder. The distinction is that while garancine is prepared from fresh madder, garanceux is made from the spent or exhausted madder. It is weaker than garancine.

Garancine.—(Germ.: *Garancin*; fr.: *Garancine, charbon sulfurique*.) A formerly important red-dyeing preparation of madder, made by treating madder-root with sulphuric acid.

Gebrannte Stärke.—Synonym for Brown Dextrines.

Gelatine.—(Germ.: *Gelatine*; fr.: *Gelatine*.) Gelatine, when pure, is colorless, tasteless, inodorous, soluble in boiling water, but insoluble in cold, though it swells up and softens. It is insoluble in alcohol.

Glauber's Salts.— Na_2SO_4 (Germ.: *Glaubersalz, Wundersalz, schwefelsaures Natron*; fr.: *Sel de Glauber, sel admirable, soude sulfatée*). Synonyms: Sodium sulphate, wonderful salt, Sally Nixon, in corruption of the ancient name *sal enixum*. Sulphate of soda crystals ($\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$) should be neutral, or at most they should have a very feeble alkaline reaction. They should dissolve in water without leaving any residue, and, above all, they should be free from compounds of iron. Look for aluminum, magnesium, common salt, insolubles.

Glauber's salts is used almost universally in dyeing wool in acid bath to aid in making the dye go on even. The desiccated Glauber's salts is the more economical.

Gloriagummi.—Different species of plant glue.

Glycerine.— $\text{C}_3\text{H}_8\text{O}_3$ or $\text{C}_3\text{H}_5 \begin{Bmatrix} \text{OH} \\ \text{OH} \\ \text{OH} \end{Bmatrix}$ (Germ.: *Glycerin, Ölsüss*; fr.: *Glycérine*). Synonym: Sweet principle of oils. It should evaporate without residue. Heating with sodium hydroxide should not color it; if it does, look for starch or sugar.

Gomein.—Synonym for Brown Dextrines.

Gommeline.—Synonym for Brown Dextrines.

Gum.—(Germ.: *Gummi*; fr.: *Gomme*.) Divided into gum proper and gum resin. The first being soluble in water, and the second substances as copal.

Gum-Arabic.—(Germ.: *Arabisches Gummi*; fr.: *Gomme arabique*.) This is the gum of *Acacia vera, nilatica, arabica*. It can be taken as a type of gum proper, and next to it comes gum-senegal. It has a tendency to get sour, but this may be

partially corrected by the addition of soda. Next in order of value comes East India gum, sometimes called Turkey gum. Adulterations: Cheap and useless gums, also dextrine, starch, tragacanth, ceresin, and insolubles. A comparative test with an accepted standard in the matter of sp. gr. is of great value.

Gum-Senegal.—(Germ.: *Senegalgummi*; fr.: *Gomme Sénégal*.) This is the gum of *Acacia Senegal*, and differs from gum-arabic chiefly by its darker color and larger amount of impurities, such as sand, earth, fragments of wood, etc.

Gum-Tragacanth (gum of *Astragalus tragacantha*).—This gum, when sold in lumps, is rarely adulterated, but in the state of powder it is often mixed with gum-Senegal. This may be detected by dissolving a portion of the suspected sample in hot water, and adding, under constant stirring, a few drops of the tincture of guaiacum. If gum-Arabic or gum-Senegal be present, a blue color will appear.

The subjoined table will be found useful in discriminating the various kinds of gums:

Gums.	Sulphate of Iron.	Tincture of Guaiacum.	Subacetate of Lead.
Gum Arabic	Yellow Precipitate	Blue Color	White Curd
Senegal	Yellow Precipitate	Blue Color	White Curd
Cherry	Yellow Precipitate	Blue Color	Transparent Jelly
Tragacanth	Yellow Precipitate	No change	Transparent Jelly
Dextrine	No precipitate	.....	.....

Gummi Germanicum.—Different species of plant glue.

Gummi Saxonium.—Different species of plant glue.

Hai-Thao, or Gelose.—Algæ from Cochin China and the Mauritius.

Hemlock Bark.—(Germ.: *Schierlingstanne*; fr.: *Sapin de Virginie*.) The bark of the hemlock spruce (*Pinus canadensis*), a tree very plentiful in the northeastern States of the American Union.

It is, like sumac, an astringent, and has not been used for dyeing purposes with satisfactory results, as it gives a rusty or "foxy" surface reflection to the goods.

Hypernic.—A name given to Nicaragua-wood, and sometimes to any other red-wood, or red-wood extract of the same class.

Hydrofugicolle.—Different species of plant glue.

Indigo.—(Germ.: *Indigo*; fr.: *Indigo*.) Obtained from the fermented and treated sap, essentially an East Indian product. The chief indigo yielding plants are various species of *Indigofera*—*tinctoria*, *disperma*, *Agil*, *argentea*, *glauca*, *cærulea*, *cineria*, *glabra*, etc.

Artificial Indigo has now largely superseded the natural product; this is one of the triumphs of modern chemistry.

Indigo-Carmine or Indigo-Paste.—(Germ.: *Indigocarmin*, *blauer Carmin*, *präcipitirter Indigo*; fr.: *Indigo soluble*.) Synonyms: Blue carmine, soluble indigo, precipitated indigo, distilled blue, extract of indigo, chemic blue, Saxony blue.

The analysis should embrace the moisture, sp. gr., insolubles, dyeings on mordanted and unmordanted cotton, as well as gun-cotton, wool mordanted and unmordanted, and a dyeing as compared with the type. The reduction should be clear and even. Fehling's solution should not be precipitated. Test filtrate for starch, chlorides, sulphates, anilines. Examine the ash of filtrate. Look for dyewoods by oxalic acid and filter paper. Adulteration with coal-tar colors is proved by dyeing gun-cotton with the suspected sample; indigo alone will not dye the gun-cotton, but the basic coal-tar colors will. The odor should be noted; the per cent. of water should be found; boiling with sulphuric acid should not turn the paste black, indicative of organic matter; precipitated with salt, and filtered, should give a clear filtrate. This filtrate, when boiled, should give no odor of dextrine. The filtrate tested with iodine should not give a coloration (starch). Digested with sulphuric acid and then tested with Fehling's solution would show any sugar which had been inverted.

The laboratory method of reporting indigoes is as follows:

Report No.	Their Mark or No.
Moisture	3.15
Ash	12.10
Specific Gravity.....	1.485
Indigotin and Indigo Red (1st determination)	44.54
Indigotin and Indigo Red (2d determination)	44.24
	2) 88.78
Average of two determinations...	44.39

Gross frauds, which are said to be sometimes attempted by the indigo makers, could be easily detected by chemical analysis, such as the admixture of ground slate, black sand, plumbago, lead-powder, starch, etc.

Indigo Sulphate, To make a Pure Extract of.—Dissolve crude sulphate of indigo in water, nearly boiling, and a quantity of old but clean white flannel or other woolen articles worked in it until saturated with color; then wash well in cold, and afterward in warm, water until the color begins to "bleed," that is, until the washing water begins to remove the blue and become tinged with it; they are then treated with hot water containing a feeble proportion of carbonate of soda; this removes the blue color very rapidly from the woolen rags, leaving them of a dull brown color; the blue thus dissolved is considered as purified. A little acid added to the extracted blue enables it to dye up a good clear blue.

Irish Moss.—(Germ.: *Irländisches (Perl) Moos, Carrageen Moos*; fr.: *Chondre crispé; Chondrus (Fucus) crispus.*) Synonyms: Pearl moss, Carrageen moss, Caragheen moss. Contains a large proportion of a gelatinous matter, pectine, or vegetable jelly.

Iron Acetate.— $\text{Fe}(\text{C}_2\text{H}_3\text{O}_2)_2$ (Germ.: *Essigsäures Eisenoxydul, Holzessigsäures Eisen, Essigsäure Eisenbrühe, Eisenbeize, schwarze Brühe, schwarze Küpe*; fr.: *Bouillon noir, tonne au noir, gris de fer, couleur de fer, acétate (de protoxyde) de fer*). Synonyms: Ferrous acetate, black liquor, black mordant, pyrolignite of iron, printer's iron liquor, iron mordant. This important mordant consists of protoxide of iron, combined with and kept in solution by crude wood-vinegar, or pyroligneous acid. It is prepared by two distinct methods: Either scrap-iron dissolved in the free acid—generally with the aid of heat—or a solution of copperas is mixed with a solution of some soluble acetate, such as acetate of lime, or lead; this is *Chamoisbeize*. Contrary to what might be expected, pure acid or pure soluble acetates do not produce as good a quality of Black Liquor as such containing a certain amount of tarry matter. Concerning the part played by this tar in dyeing, there is some diversity of opinion. It is found that the purified acid produces a less satisfactory liquor, a fact due, according to Moyret, to the presence of a small quantity of pyro-

catechol in the crude acid, which forms a compound with the ferrosoferric oxide in the solution, and causes its intense color and keeping properties.

The liquor used by dyers is often concentrated, not by evaporation, but by the addition of copperas (ferrous sulphate), thus, the addition to 1 gallon of Black Liquor, sp. gr. 1.085, of $\frac{1}{2}$ pound of copperas would raise its density to 1.111. Over 1 pound of copperas has been found in 1 gallon of iron liquor. Tannin also is sometimes added. Black Liquor is also prepared by the action of ferrous sulphate or acetate of lime; the liquor produced has an average density of 1.11, and always contains sulphate of lime.

Black Liquor is sold at different strengths, ranging from 10° to near 30° Twaddle. It has an astringent taste, is of an olive color, but in large quantities it appears black.

It serves for producing upon cotton a variety of shades according to its strength, and the coloring-matter with which it is used. It gives its oxide of iron to the fiber more readily than copperas.

The peracetate of iron-acetate, or pyrolignite of the peroxide, has been proposed as preferable to nitrate of iron, but has scarcely received any other than mere experimental application.

To find if Black Liquor is genuine, add a little nitric acid, and apply heat to peroxidize the iron. Then add excess of ammonia, and filter off the precipitate. The clear liquid remaining is evaporated to dryness, and the residue heated strongly. Nothing should remain but a trace of carbon derived from tarry matter. If common salt had been added to raise the Twaddle, it will be found as a white mass.

Iron Nitrate.— $\text{Fe}_2(\text{NO}_3)_6$ (Germ.: *Salpetersaures Eisenoxyd*; fr.: *Rouille, pernitrates de fer*). Synonyms: Iron nitrate "true," iron-mordant, rust-mordant. Made by dissolving iron in nitric acid; is made also by running concentrated nitric acid into a solution of copperas made by driving steam into the solid crystals of FeSO_4 .

Iron for blue should be sharper than iron for other purposes; if too "dead"—that is, if the amount of iron be too great in proportion to the acid, a part of the Prussian-blue formed will be deposited at the bottom of the dye-pan, and that which is fixed upon the goods will be dull, loose, and

cloudy. The nitrate of iron must not be acid, otherwise the color is thinned and probably irregular.

Add to a small portion of the sample pure ammonia, till all the oxide of iron has been precipitated. This is then filtered off, and the clear liquor evaporated down to dryness and the residue heated to redness in a small porcelain capsule. If any fixed matter remains, the sample has been got up with nitrate of soda. Alumina is an objectionable impurity.

To ascertain whether any portion of the iron is in a state of protoxide, drop in cautiously a solution of carbonate of soda. If the sample be a pure peroxide, the precipitate will be of uniform pale yellow. If any protoxide be present, clouds of a greenish color appear in the liquid. Or a dilute solution of the red prussiate of potash may be added, which, if any protoxide exist in the sample, will give a blue precipitate.

Iron Protonitrate.— $\text{Fe}(\text{NO}_3)_2$ (Germ.: *Salpetersaures Eisenoxydul*; fr.: *Protonitrate de fer*). Made by combining 1,750 parts copperas with 2,080 parts nitrate of lead, both in solution; is also made by dissolving FeS in cold HNO_3 diluted.

Iron Salts.—A convenient test is a solution of tannin and a solution of logwood.

Iron, Sulphate of. See **Copperas**.

Japanleim. Different species of plant glue.

Johannisblut, Deutsche Cochenille (St. John's blood).—An old name for kermes, so named because it was collected with considerable religious ceremony on St. John's day. See **Kermes**.

Kermes.—(Germ.: *Kermes*; fr.: *Kermès, Alkermes*.) Synonym: St. John's blood, since it was collected from the oak-trees on St. John's Day with considerable religious ceremony. It is derived from the female insect *Coccus Ilicis*, which is found principally upon the Ilex oak (*Quercus Ilex*). At one time a great deal of kermes was sent to Venice to produce the scarlet to which city it owes its name.

Lac Dye.—(Germ.: *Färbelack*; fr.: *Laque en teinture, laque en trochisques*.) A color of the same class as cochineal. Consists of small parasitical insects—*Coccus ficus* (*Laccæ*)—cemented together by a resinous matter exuding from the twigs of the trees which they inhabit. A good lac should be soft, so as to be broken by the fingers. The fracture should not have a shining resinous appearance, and should give out a

strong peculiar odor. If it be very hard, with a resinous fracture, it contains a large amount of shellac.

Lactarine. See *Caseine*.

Lactolin.—An acid lactate of potash, suggested by Boehringer as a substitute for lactic acid.

Lead Acetate.— $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 + 3\text{H}_2\text{O}$ (Germ.: *Bleizucker*; fr.: *Acétate de plomb, céruse de Mulhouse, saccharate de plomb, Sucre (sel) de Saturne*). Synonyms: Normal or diacetate of lead, sugar of lead, salt of Saturn, "saccharum." Two kinds of sugar of lead are met with in the market—the brown and the white. The chief impurities which are likely to interfere with its use are acetates of iron and copper.

A coarser variety, known as brown acetate, is prepared by substituting distilled pyroligneous acid for the purer acid.

Lead acetate is only used for cotton. There it has been used for yellows and oranges in times long gone by. To-day a basic acetate with litharge, mordants cotton on simple immersion, and is used for eosines and similar colors.

Lead acetate has a sweet, pleasant taste, but is a virulent poison. Its antidote is Epsom Salts (which forms an insoluble lead sulphate), the whites of eggs, and emetics; avoid NaCl.

Lefébregummi.—Synonym for Brown Dextrines.

Leiocomme.—Synonym for Brown Dextrines.

Leiogomme.—Synonym for Brown Dextrines.

Lime, Caustic.— CaO (Germ.: *Calciumoxyd, Gebrannter Kalk, Aetzkalk, ungelöschter Kalk*; fr.: *Chaux vive (caustique, calcinée, anhydre)*). Synonym: Quick-lime.

Lime, Hydrate of.— CaH_2O_2 (Germ.: *Calciumhydroxyd, Kalkhydrat, gelöschter Kalk*; fr.: *Chaux hydratée (éteinte), hydrate de chaux*). Synonym: Slaked lime. Impurities are iron, aluminum, magnesium, and sand. Lime can generally be sufficiently tested by making a milk of lime, and observing the precipitate which is left; further, well-burned lime slakes and warms quickly, while badly prepared lime remains lumpy and gives off carbonic acid on addition of acids. From the slaking powers of limes they are characterized as "rich" or "fat," in contradistinction from "poor."

Litmus.—(Germ.: *Lackmus*; fr.: *Tournesol*.) Used as a test-paper. Alkalies turn it blue, while acids turn it red.

Logwood.—(Germ.: *Blauholz, Campecheholz, Blutholz, Allerheiligenholz*; fr.: *Bois de campêche*). Synonym: Campeachy-

wood. Logwood is the wood of a South and Central American tree, *Hæmatoxyllum campechianum*. Chip-logwood sells for less than the logs themselves, because, after cutting up into chips, they increase in weight.

The analysis should embrace water, sp. gr., insolubles, alizarines, resins, glucose, hematin, and hematoxylin. Apt impurities are hemlock and chestnut extracts, molasses and glucose, farina, chlorides, sulphates, carbonates, insoluble residues, lime, etc. If chip-logwood is bought, test for anilines by throwing on to a beaker of water and noting how it dissolves. Use test-papers on the solution made. Look for moisture by weighing, drying, and reweighing; look for alkalis with litmus.

The comparative quality of samples of logwood may best be judged when they are dry. Those which exhibit the most stains and particles of a greenish bronze on the surface of the wood are the best. For greater accuracy, equal weights of the samples, say five grs. of each, may be taken and placed respectively in clear white glass phials or tubes of equal caliber and size. Upon each is poured 10 to 20 cc. of methylated spirit, and the phials are allowed to stand for an hour with occasional shaking.

For the comparative test dissolve 25 cc. of the sample to be tested in one liter of water, and in another liter of water the same quantity of the standard logwood; heat the two solutions to boiling, and then enter equal-sized pieces of cotton cloth; stir continually, and in about five minutes remove and squeeze carefully and evenly; do not wash, but throw them into a bath made up of 10 gr. bichromate of potash in a liter of water; stir well, and, after five minutes, heat so as to warm to about 30° to 35° Centigrade. Then wash well in cold water, dry, and compare. A logwood should be reported as follows:

Report No.

Date.

Laboratory No.

Their Mark or No.

Hematine

Hematoxylin:

Ash (mineral):

Water:

Sp. Gr.:

Beaumé:

Twaddle:

Insolubles:

Alkali:

Chestnut-extract:

Resins:

Alizarines:

Anilines:

Glucose:

A report of a logwood in this form places the management of the mill in a position to know whether the logwood is a proper logwood or not.

Lunar Caustic.—Nitrate of silver.

Madder.—(Germ.: *Färberröthe*, *Krappwurzel*, *Röthe*; fr.: *Garance*, *racine de garance*.) The root of *Rubia tinctorum* (*peregrina*, *mungista*), which formerly was grown in enormous quantities in the Levant and southern France. It is now entirely supplanted by alizarine. Its use was the dyeing of Turkey-red. The replacement of madder by products of coal-tar is one of the most enduring monuments for the glory of chemists. It is rapidly assuming its true place as a museum curiosity.

Manganese Brown.—Cloth is saturated with $MnCl_2$ and then treated with $NaOH$, which must be free from Na_2CO_3 —, otherwise manganous carbonate is produced, making the color irregular. One, Endler, passes the cloth impregnated with $MnCl_2$ through a bath containing 25 liters H_2O , 7 liters $AmOH$, and 500 gr. bichromate of potash. This produces an unstable chromate of manganese, which, on decomposing, allows the chromic acid to react on the manganous hydrate and change it to some higher state of oxidation.

Methyl-Orange.—(Germ.: *Methylorange*; fr.: *Méthyl orange*.) Dissolve one gram per liter. It is not affected by CO_2 , and H_2S . Must not be used for organic acids, as the end reaction is indefinite. Can be used for the estimation of free acids in alum, ferrous-sulphate or chloride, zinc-sulphate, copper-sulphate, or copper chloride.

Mordant.—(From *Mordeo*, I bite. Germ.: *Beizmittel*, *Beize*; fr.: *Mordant*.) Any substance used to bind the coloring-matter and the fiber. Vegetable fiber has not affinity for all dyes, and must be so treated as to combine with the dye to form a relatively insoluble compound.

Munjeet.—Synonyms: Mungeet, munjit, Indian madder. The root of *Rubia munjista* (*cordifolia*), a plant of the madder family. It comes in bunches of stalks nearly a yard in length, varying from the thickness of a finger downward. It does not contain much coloring-matter. It is used for making low qualities of garancine.

Myrabolans.—(Germ.: *Myrabolanen*; fr.: *Myrabolans*.) A fruit produced in the East Indies, extensively consumed as a source of tannin, shape and size like a dried plum. The tannin is very variable in amount. Apt impurities are earth, sand, nux vomica, betel nuts, and a variety of seeds and berries, ground divi-divi, old worthless sumac, and wild gall-nuts. The detection of these impurities is easily accomplished under the lens. A sample of the powder should be scattered on a white paper and a slight acquaintance with the different things used in sophistication will be revealed. Canaigre plant seems to be the better plant for tannin.

Nessler's Reagent.—See *Ammonia*.

Neuleim.—Different species of plant glue.

Oxycellulose.—This was discovered by Professor Witt. It can be made artificially by putting a piece of cotton into the solution of chemic and allowing it to stand for a little while, partially exposed to the air. Where the air strikes the cloth at the surface of the liquid, an oxidation product is formed, namely, oxycellulose. Its presence can be shown by boiling the piece of cloth in methylene blue. The oxycellulose has all the powers of a mordant for the aniline dye, and will show a deep coloration where the oxycellulose has been developed. Goods that are allowed to stay for any length of time in the chemic bin may have oxycellulose formed where the chemic solution has dried out.

Peachwood.—(Germ.: *Pfirsichholz*; fr.: *Bois de pêche*.) This wood is one of the red woods similar in all its characters to Brazil-wood, although held to be poorer in coloring-matter.

Pearl-ash.—(Germ.: *Perlasche*; fr.: *Perlasse*.) Refined salt of potash (potassium carbonate, K_2CO_3).

Peroxide of Hydrogen.— H_2O_2 (Germ.: *Wasserstoffsuper-oxyd*; fr.: *Peroxyde* (*bioxyde*) *d'hydrogène*). Used in such bleaching as feather-bleaching, but its cost has always limited its application.

Peroxide of Sodium.— Na_2O_2 (Germ.: *Natriumperoxyd*; fr.:

Peroxyde de soude). A bleaching agent manufactured on a large scale, and successfully used on the bleaching of fibers, particularly of mixed goods. Dr. Haen has proposed that the peroxide be used in conjunction with Epsom salts.

Phenacetoline.—For KOH or NaOH in carbonates.

Phenol-Phthaleine.—For titrating oxalic, acetic, citric, or tartaric acids. Five gr. per liter is proper strength. Crimson when alkaline, colorless when neutral or acid.

Pink Salts.— $\text{SnCl}_4, 2\text{AmCl}$ (Germ.: *Pinksalz*, *Ammonium-Zinnchlorid*; fr.: *Chloride d'étain ammoniacal*). A name given to the double chloride of tin and ammonia. It was formerly employed instead of the other salts of tin, in the wood-pinks; it is now very seldom met with in commerce.

Plant-Glue, different species of:

Alligin,	Hydrofugicolle,
Arabil,	Japanleim,
Brilliantkleister,	Neuleim,
Gloriagummi,	Traganthine,
Gummi Germanicum,	Universalleim.
Gummi Saxonicum,	

Plaster of Paris.— CaSO_4 (Germ.: *Gebrannter Gips*; fr.: *Plâtre fin*). Synonyms: Sulphate of lime, or white mineral.

Potash.— K_2O (Germ.: *Kaliumoxyd*, *Kali*; fr.: *Potasse*. Synonym: Potassa. It should dissolve entirely in pure water, leaving no sediment or residue. If dissolved in distilled water, acidified with nitric acid, the solution, on the addition of nitrate of baryta, should not give a precipitate. If one appears, it denotes the presence of sulphuric acid, present as sulphate of potash.

Potash, Chlorate of.— KClO_3 (Germ.: *Kaliumchlorat*, *Chlorsaures Kali*; fr.: *Chlorate de potasse*). The solution should yield no precipitate with a dilute solution of the nitrate of silver.

Potash, Chromate of.— K_2CrO_4 (Germ.: *Kaliumchromat*, *Chromsaures Kali*; fr.: *Chromate de potasse*). Synonyms: Yellow chrome or neutral chrome. The impurities in yellow chrome are carbonate of potash and sulphate of potash. The latter is sometimes present to the extent of 56 per cent.

Potassium, Bichromate of.— $\text{K}_2\text{Cr}_2\text{O}_7$ (Germ.: *Doppeltchromsaures Kalium*, *Kaliumbichromat*; fr.: *Bichromate de potasse*). Apt impurity, sulphates.

Potassium, Prussiate of.— KCy or K(CN) (Germ.: *Cyan-kalium*, *blausaures Kali*; fr.: *Prussiate de potasse*, *cyanure de potassium*). Synonyms: Prussiate of potassa (potash), cyanide of potash. Very poisonous. Antidotes: Emetics; cautiously inhaled H_3N .

Potash, Yellow Prussiate of.— K_4FeCy_6 (Germ.: *Ferrocyan-kalium*, *Kaliumeisencyanür*, *Gelbes Blutlaugensalz*; fr.: *Prussiate jaune de potasse*, *cyanoferrure de potasse*, *ferrocyanure de potasse*, *lessive du sang*). Synonyms: Yellow prussiate, potassium ferrocyanide, ferrocyanuret of potash, blood-salt. The chief contamination to which it is liable is sulphate of potash. It is used for making "Prussian Blue."

Potash, Red Prussiate of.— K_3FeCy_6 (Germ.: *Ferricyan-kalium*, *Kaliumeisencyanid*, *Rothes Blutlaugensalz*; fr.: *Prussiate rouge de potasse*, *cyanoferride de potasse*, *ferricyanure de potasse*).

Quercitron Bark.—(Germ.: *Quercitron Rinde*; fr.: *Quercitron*.) The bark of *Quercus tinctoria* (*nigra*). Synonym: Bark. It was introduced into England at the close of the last century, and soon came into use as being cheaper and stronger than the yellow coloring-matters then known in the trade. It dyes up good yellows upon wool and cotton—on the first with a tin mordant, and upon the second with an alumina mordant. Quercitron is ballasted with NaCl , Na_2CO_3 , etc.

Red Liquor.—(Germ.: *Essigsäure Thonerde*, *Aluminiumacetat*; fr.: *Acétate d'alumine*.) Synonyms: Acetate of alumina, red mordant, pyrolignite of alumina. An aluminium sulphoacetate appears to act satisfactorily. It is prepared by mixing, first, 453 pounds ammonia alum (383 pounds aluminium sulphate), 379 pounds lead acetate, 1,132 pounds water; or, second, 453 pounds alum (or 333 pounds aluminium sulphate) and 158 pounds acetate of lime. The mixture is agitated, settled, and the clear liquid decanted.

Red Liquor usually contains from 3 to 5 per cent. alumina (Al_2O_3) and 6 to 10 per cent. acetic acid; its density varies from 1.085 to 1.120.

Redwood. See **Brazil-wood**.

Salt (common).— NaCl (Germ.: *Kochsalz*, *Chlornatrium*; fr.: *Sel*). Apt impurities are CaSO_4 , MgCl_2 , NaSO_4 , and insolubles.

Santal-Wood.—(Germ.: *Sandelholz*, *Rotes Santelholz*, *Calia-*

turholz; fr.: *Bois du santal, bois de santal rouge.*) Synonyms: Sandal-wood, Saunders-wood, and Red-sanders, *Pterocarpus santalinus (indicus)*.

Soap.—(Germ.: *Seife*; fr.: *Savon*.) Additions are glycerine, derived from the oil or fat employed, water, alkaline sulphates, chlorides, and carbonates from the impurities in the potash or soda employed, rosin, silicate of soda, Cornwall-clay, ground flints, potter's slip, Fuller's earth, gelatine, and other kinds of nitrogenous animal matter, dissolved in soda; farina, dextrine, and a variety of other substances.

Rosin is a common ingredient in yellow soaps. In all soaps intended for the use of the dyer or printer, it is an objectionable impurity, imparting to the goods an unpleasant clamminess or stickiness. It may be easily detected. Dissolve some of the soap in as little boiling water as possible. Add enough hydrochloric, or dilute sulphuric, acid to combine with the alkali, and liberate the fatty matters. Then cover the vessel in which the whole is contained with a lid or a plate of glass, and set it aside for a few minutes. On uncovering it, rosin, if present, may be easily detected in the cake of fatty substances by its smell and taste, and by the peculiar stickiness which it imparts to oils and fats with which it is mixed.

Silicate of soda as a constituent of soap has given rise to a great variety of opinions. Some condemn it as a mere adulteration and even deny that it has any detergent powers.

Insoluble silica and alumina, in the various shapes of Cornish-clay, powdered pumice, ground flints, potter's slip, and Fuller's earth, can be and often are added to soaps to a considerable extent.

Animal matter other than fat, such as tendons, intestines, ground bones, waste glue, etc., can be regarded in no other light than a filthy adulteration. The detection of such impurities is not difficult. A little of the soap is dissolved in hot water, and decomposed by the addition of a little hydrochloric acid. The spurious animal matters will be entangled in the cake of fat which separates out, and may be easily recognized.

Farina and dextrine are less formidable. They add, of course, nothing to the value of the soap, but they have no positively injurious action. To detect them, dissolve the soap in strong alcohol. Farina and gum remain undissolved, and

may be separated from the other articles by filtering. Farina is then easily recognized by adding a drop or two of the tincture of iodine, which, if farina be present, will give to the mass a deep blue-black color. Dextrine (British gum) may be dissolved out from any mineral impurities present in a little hot water, and can be readily recognized.

The following oils and fats should be carefully avoided: Train oil, cod-fish oil, linseed oil, kitchen refuse, fat collected by bone boilers, grease separated out from accumulated soap-lyes. All these give evil-smelling, clammy soaps.

Soap Powders.—Washing powders, scouring salts, washing sugars, soap ashes, extracts of soap, extract of Fuller's earth, saponaceous, etc., etc. These are bodies which have been very largely used, not only for domestic, but also for manufacturing purposes.

Soda Ash.— Na_2CO_3 (Germ.: *Soda, kohlenaures Natron*; fr.: *Soude, carbonate de soude*). Synonyms: Soda carbonate, ash, alkali, or soda. Apt impurities: Substances insoluble in water, chlorides, phosphates, sulphates, lime, iron, sulphides, sulphites and hyposulphites, and caustic soda.

Perhaps the most harmful impurity is caustic soda, which is very injurious to wool. Test for this by precipitating the carbonate with barium chloride, filter, and add phenol-phthalin; a pink color is developed if caustic soda was present.

The sulphite and hyposulphite are tested for by adding some dilute sulphuric acid, to which a little bichromate of potash has been added. If a green color is produced the solution is proved to have held the sulphite or hyposulphite.

The sulphide of sodium is tested for by the addition of sulphuric acid, when the odor of H_2S is evolved; if a portion is dissolved in water and then filtered, produces a black precipitate (PbS), when a solution of acetate of lead is poured into it.

The strength is found by titration simultaneously with the standard. Both samples must be dried equally, dissolved in distilled water in exactly equal weights, and methyl-orange used as the indicator.

Soda ash is usually sold on a basis of 48 per cent.; for every per cent. over 48 per cent., $1/48$ is added to the bill. This full claim is very rarely sustained by the analysis. Mills should buy on sample and then send the sample by which they purchased to the laboratory, and also a small sample taken from

the lot shipped them, and then the bill should be paid in accordance with the results of the analysis.

The normal solution of soda is 53 gr. per liter.

Soda Crystals.— $\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}$ (Germ.: *Krystallisirtes kohlsaures Natron, Sodasalz*; fr.: '*cristaux de soude, sel de soude*'). Synonyms: Carbonate of soda crystals, Scotch soda, Newcastle soda, crystallized carbonate of soda, washing soda, sal soda. Contains 63 per cent. of its weight of water.

Soda, Sesquicarbonate of.— $\text{Na}_2\text{CO}_3, 2\text{NaHCO}_3$ (Germ.: *Andersthalbfach-kohlsaures Natron*; fr.: *Sesquicarbonate de soude*). The principal constituent in natural "Trona" ("Urao") Soda. As it is anhydrous, it contains nearly 49 per cent. Na_2O , which is equivalent to 83 per cent. Na_2CO_3 .

Sodium, Arseniate of.—Impurities: Salt and phosphates. *See Arseniates.*

Sodium, Bisulphite of.— NaHSO_3 (Germ.: *Zweifach-schwefligsaures Natron*; fr.: *Bisulfite de soude*). *See Antichlor.*

Sodium Hyposulphite (thiosulphate) of.— $\text{Na}_2\text{S}_2\text{O}_3 + 5\text{H}_2\text{O}$ (Germ.: *Unterschwefligsaures Natron*; fr.: *Hyposulfite de soude*). Synonym: Green mordant.

Sodium, Hydrate of.— NaHO (Germ.: *Natriumhydroxyd, Aetznatron*; fr.: *Soude caustique à la chaux*). Synonym: Caustic soda. Impurities can be NaCl , Na_2SO_4 , alumina, silica, carbonate, and iron. Titrate with methyl-orange.

Sodium, Silicate of.— Na_2SiO_3 (Germ.: *Kieselsaures Natron, Wasserglass*; fr.: *Silicate de soude*). Synonyms: Soluble glass, waterglass, flint-liquor. A compound formed by melting together sand with carbonate of soda ($\text{SiO}_2 + \text{Na}_2\text{CO}_3 = \text{Na}_2\text{SiO}_3 + \text{CO}_2$). It is used as an addition to soaps; as a sizing and as a mordant. Combines the properties of soap and caustic alkali, and is well adapted to some operations where the soda-ash is not strong enough and where the alkali is too keen.

Sodium, Stannate of.— $\text{Na}_2\text{SnO}_3 + 3\text{H}_2\text{O}$ (crystals) (Germ.: *Zinnsaures Natron, Grundirsalz, Präparirsalz*; fr.: *Stannate de soude*). Synonym: Preparing salt. To ascertain its value, a portion of the sample should be dissolved in a small quantity of water, slightly acidulated with hydrochloric acid, and some strips of clean, pure metallic zinc placed in the solution. The tin will be thrown down in a spongy state.

The impurities likely to be met with are common salt—an intentional fraud—and an excess of alkali, caustic or carbon-

ated, resulting from bad workmanship, of nitrate of sodium, sulphate of magnesium, and iron. Certain additions are also occasionally made to the stannate, not with fraudulent design, but avowedly for the purpose of improving its quality. These are the tungstate of soda, the antimoniate of soda, and the arsenite and arseniate of soda. Sodium stannate should dissolve clear, but not too clear, in which case suspect free muriatic acid; its value depends upon the amount of tin it contains.

Method of Analysis.—The sample must first be ground in a mortar, and then anywhere from two to five gr. of the stannate is weighed out and ground again in a mortar with the water. The mixture is allowed to stand for about half an hour, then it is poured on to a weighed filter-paper. It is washed with warm water several times until the wash-water going through the filter gives no precipitate when acidified. The filtrate contains all the soluble stannate of soda. The filtrate is heated with dilute sulphuric acid, running the acid in from a burette: the acid solution clouds up, and must be allowed to settle, after which the clear liquid is poured off and filtered; the precipitate is washed once with warm water and then the whole is washed on to the filter-paper by means of a wash-bottle. It is washed three or four times on the filter-paper, dried, placed in a porcelain crucible, heated to red heat, cooled, moistened with nitric acid, heated again to a red heat, and weighed.

Sodium, Sulphate of.—*See Glauber's Salts.*

Starches. *Analyses and Tests.*—The relative tenacity of starches can be determined by weighing out equal parts of each sample, mixing with equal volumes of water, boiling briskly for three minutes, constantly stirring, and then pouring into a conical test-glass and allowing to cool. Then carefully turn the contents of each glass out, and note time it takes before a "land-slide" occurs. The starch which stands longest is best.

Starch is sometimes deteriorated by the presence of nitrogenous matter. To detect this, dissolve one part of mercury in two parts of nitric acid of 50° Twaddle at a gentle heat. When dissolved, boil the liquid for a few minutes. If the sample is colored reddish when boiled with this reagent, nitrogenous matter is present. In the laboratory the following determinations are made: Ash, viscosity, moisture (allowing

15 per cent.), Fehling's solution test, grit, taste; if there is considerable ash, the starch is tested for sulphates, chlorides, mineral-white, gypsum, and china clay.

Pure wheat-flour is almost entirely dissolved in a strong solution of potash containing 12 per cent. of the alkali; but mineral substances used for the purpose of adulteration remain undissolved. Under the microscope the granules are characteristic and very well defined. In some cases the microscopic examination is aided by an application of a solution of potash. Thus we may readily detect the mixture of wheat-flour with either potato-starch or meal of peas or beans by the addition of a little water to a small quantity of flour, then by adding a few drops of a solution of potash, when the granules of the potato-starch will immediately swell up and acquire three or four times their natural size, while those of the wheat-starch are scarcely affected; if adulterated with pea- or bean-meal, the hexagonal tissue of the seed is at the same time rendered very obvious under the microscope.

The reaction of starch ought to be neutral; if it shows alkaline reaction it should be rejected, as it is in that case apt to cause trouble in finishing. The formation of a gelatinous paste is accelerated by adding caustic potash, and for that reason some dealers add this impurity.

The usual method for the determination of starch is to invert by the action of dilute acid, nitric acid, and then determine the dextrose produced by Fehling's solution. One hundred parts of the dextrose are taken as equivalent to ninety of starch.

The proportions for the iodine test are: One gram starch stirred to a cream with a little cold water; then add 60 cc. hot water, and the whole is boiled; of this mixture, three drops are placed in 10 cc. water. and the iodine colors it as soon as it is set free.

Potato-starch produces the thickest paste, weight for weight, because the grains are exfoliated by high heating. Rice is less adhesive, and cannot be used to fix large proportions of earthy matter, clay, or minerals in the fabric.

Test for Flour in Starch.—Stir to a paste with strong nitric acid, and if the sample be starch it will remain white, but if there be any flour in the sample the color will alter to a

strong yellow. The sp. gr. test often gives interesting information. It can be made by boiling a certain weight of a sample in sufficient water to prevent it from solidifying when it cools; the sp. gr. of the cool solution gives a comparative test of oftentimes considerable value.

The adulteration of mineral matter is best detected by shaking the sample in a test-tube with chloroform. The starch floats on the chloroform and the mineral substances go to the bottom.

In German the different starches are known as follows: Potato is *Fecule*; cor is *Mais*; wheat-starch is *Weizen*.

Sumac.—(Germ. *Sumach*, *Schmack*; fr.: *Sumac*.) Synonyms: Sumach or shumac. Leaves and smaller branches of a shrub, *Rhus coriaria* (*Cotinus*). That which comes from Sicily is the most esteemed, and brings the highest price, but several other countries produce a usable article. Has a smell reminding of tea, or sometimes of new hay. Its quality can be judged of by its color to a considerable extent; it should be bright and clear; some samples are dull and have a faded brown look. Examination should embrace the ash, water content, insolubles, glucose, dyeings on unmordanted cotton and wool. Sumac has the same chemical properties as galls, containing the same acids, tannic and gallic; but, in addition, it has a certain amount of yellow coloring-matter, which, though nearly worthless in itself, modifies its effects upon mordanted cloth.

The chief consumption of sumac is probably in cotton-dyeing, where it is the preliminary treatment for nearly all the fancy shades to steep the cotton for some hours in decoction of sumac. The astringent matter of the sumac is thus firmly combined with the cotton, which can now be easily mordanted with either tin or alumina, which forms the basis of the colors. Sumac liquors have a strong tendency to become acid, which must be guarded against in those cases where an iron-alumina mordant is concerned, since the acidity is sometimes strong enough to dissolve out weak iron mordants.

The laboratory method for reporting sumac is as follows:

Report No.	Date.
Laboratory No.	Their Mark or No.
Tannic acid:	
Ash (mineral):	

Water:

Specific Gravity:

Beaumé:

Twaddle:

Insolubles:

Resins:

Anilines:

Alizarines:

Glucose Test:

Tartar-Emetic.— $K(SbO)C_4H_4O_6 + \frac{1}{2}H_2O$ (Germ.: *Brechweinstein*, *Spiessglanzweinstein*; fr.: *Tartar émétique*). Synonyms: Potassium-antimony-tartrate, *tartarus stibiatus*. Mixtures of tartar-emetic for mordanting are sold containing as much as 33 to 59 per cent. zinc sulphate at a lower price, under the names tartar-emetic powder, tartar-emetic substitute, antimony mordant, etc. It is known that zinc acetate may partly replace the tartar-emetic with advantage, but the sulphate appears to be a simple adulterant.

Several other compounds of antimony have been proposed instead of tartar-emetic for mordants. E. Jacquet advises the use of a mixture of basic antimony oxalate with twice its weight of ammonium oxalate. Nölting recommends the double oxalate of potash or of ammonia. The use of the fluoride (which is not precipitated with the excess of water) and the double fluorides of antimony and the alkalis has been patented by S. M'Lean. C. Watson, Jr., has recently patented a process for using tri-chloride with sufficient common salt to prevent the precipitation of the oxychloride.

Test.—Take 1 gr. of the sample to be analyzed, add starch solution, and $\frac{1}{2}$ to $\frac{1}{4}$ gr. $Na_2CO_3, 10H_2O$, then let the centi-normal iodine solution run in; shake till the blue disappears, and add more until the blue remains permanent, which will occur when all antimonoxide is converted to antimonic acid. Multiply the cc. of iodine solution used by 1.66, and the per cent. of tartar-emetic is found; 0.72 is per cent. of antimony oxide.

A double salt of antimony-fluoride and ammonium sulphate, $SbF_3(NH_4)_2SO_4$, is patented and sold by Haën, of Hanover, Germany, and is called by him "*Antimony Salt*." It forms white oblique crystals, and dissolves very easily in water. The solution possesses a strong acid reaction, and attacks glass and metals like other fluorides. It contains 47 per cent.

Sb_2O_3 . Nine parts of it are equal to 10 parts of tartar-emetic. Tartar-emetic has 43 per cent. Sb_2O_3 . Antimony oxalate contains 23 to 27 per cent. oxide of antimony.

Tartar, Crude. See Argols.

Tartar, Cream of.—When used as a mordant cream of tartar should be employed to the extent of 2 per cent., then bichromate of potash, 3 per cent.; this should be boiled one hour, cooled, and washed.

Tin Mordants; Stannous Chloride.— $\text{SnCl}_2 + 2\text{H}_2\text{O}$. (Germ.: *Zinnchlorür*, *Zinnsalz*; fr.: *Sel d'étain*). Synonyms: Protochloride of tin, "tin crystals," or "tin-salt." Apt impurities are sulphate of zinc, sulphate of magnesia, and chloride of zinc. When sold in solution it is known as the single or double muriate of tin, according to the specific gravity 1.3 or 1.6; 60° or 120° Twaddle.

Stannous chloride and certain dyewood extracts form "Carmines," "Persian Berry Carmines," "Cochineal Carmine," etc., occasionally used. In Turkey-red the tin crystals are used to brighten the color. In the case of wool the tin crystals are used with cream of tartar and other assistants. In silk-dyeing it is used principally in conjunction with catechu in producing heavily weighted blacks.

"Tin Spirits" is a name given to solutions of tin, in the manufacture of which other acids besides HCl are used, e.g., HNO_3 and H_2SO_4 . They are variable in composition, and their value must be determined especially in each case. One of them is "Scarlet Finishing Spirit," a muriate of tin containing a certain proportion of oxalic acid and sometimes tartaric.

Toluidine.—Orthotoluidine (formerly known as pseudotoluidine) is an oily liquid, boiling at 386° F. It gives a violet color with solution of chloride of lime and muriatic acid, and a blue with a mixture of sulphuric and nitric acid. Metatoluidine, which is less often met with, is also a liquid boiling at the same temperature. These toluidines give each different results in color-making.

Traganthine.—A different species of plant glue.

Turmeric.—(Germ.: *Gelbwurzel*; fr.: *Safran des Indes*, *souchet des Indes*.) Synonyms: *Curcuma*, *Terra merita*. A yellowish coloring-matter, the root of *Curcuma longa rotunda*, growing in the East Indies, and now chiefly cultivated in Bengal. It is mostly used in silk-printing and dyeing. Is used

also for dyeing the cotton employed for making ham-bags. The color is not at all fast. The only adulteration to which turmeric is liable in commerce is common salt, which is sometimes added in quantity to the roots while going through the mill.

Ultramarine.—(Germ.: *Ultramarin*; fr.: *Bleu d'outremer*.) Synonyms: Lazurstein, lapis lazuli, silicate of alumina and soda. Impurities might be coal-tar colors, Turnbull's blue, gypsum, and moisture. The most satisfactory test is a comparative test showing the relative resistance of a sample against acid and alum.

Universalleim.—Different species of plant glue.

Weld.—(Germ.: *Wau*; fr.: *Gaude*.) Synonym: Wold. The yellow dyeing-color employed before the introduction of quercitron. It is the herb *Reseda luteola*, and sold in the sheaf, like straw; the whole of the plant, except the roots, were employed in dyeing, but the greater part of the color resides in the seeds and upper extremity.

Whitewash.—(Germ.: *Kalkbrühe*, *Weisse*; fr.: *Lait de chaux*.) The best proportions for whitewash are two pails of water, $\frac{3}{4}$ pound quick-lime, $1\frac{1}{2}$ pounds salt, and 1 pound of dextrine.

Woad.—(Germ.: *Waid*, *Pastel*; fr.: *Pastel*, *vouède*, *guède*.) This dyeing matter, which was employed from the most ancient times, is now nearly unknown in this country. It is yet cultivated in some parts of Europe (*Isatis tinctoria*, *Nerium tinctorium*), where it goes under the name of pastel. The coloring-matter it contains is chemically and practically the same as indigo; it is still used in setting the indigo vats for dyeing woolen, but always in conjunction with indigo. It appears that the woad plant, as sold to the indigo dyer, readily enters into fermentation, and in that state is useful in deoxidizing or reducing the indigo to the soluble condition; but it contains very little coloring-matter itself, so that it was hardly possible to dye a deep blue with it.

Xanthopyll. See Chlorophyll.

Zinc Acetate.— $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2$ (Germ.: *Essigsäures Zink*; fr.: *Acétate de zinc*). Recommended as a substitute for tartar-emetic in fixing tannin on cotton. It is also used in wool-dyeing with malachite-green.

Zinc Dust.—(Germ.: *Zinkstaub*; fr.: *Poussière de zinc*.)

The ZnO_2H_2 always present in specimens of zinc-dust may be removed by digesting with NH_4Cl -water, and then with NH_3 -water and drying.

Zinc Chloride.— ZnCl_2 (Germ.: *Chlorzink*; fr.: *Chlorure de zinc*). Synonyms: Muriate of zinc, butter of zinc. The use of zinc chloride is steadily decreasing. It is antiseptic and deliquescent.

Zinc Sulphate.—Sulphate of zinc.

PART III.—NEW BOOKS.

"*Matières Colorantes Artificielles*" is a two-volume work of 1,645 pages, by Léon Lefèvre, and should be in the hands of every color-chemist. In many ways it is an advance on Schultz's "*Chemistry of the Coal-Tar Colors*." The last French book that went into the subject with anything like thoroughness was the three-volume work of Depierre. The book is fully illustrated with samples dyed and printed on cotton, wool, and silk. It is published by the house of G. Masson, of Paris.

The third edition of Schultz's "*Tabellarische Uebersicht der Künstlichen Organischen Farbstoffe*" appears from the press of R. Gärtner, Berlin. It is impossible for anyone who pretends to keep abreast with the times in the matter of the coal-tar colors to get along without this book. Each dye is given with its trade name, its scientific name, and its constitution, the literature concerning the dye, the properties, reactions, and application. It is altogether the best and most usable book which has ever appeared in the technology of dyes and dyeing.

"*Dictionary of Coal-Tar Colors*," by J. H. Hurst. This is a translation of Schultz & Julius. It is a great misfortune for a colorist not to have a practical command of German and French, and particularly the German. Almost all the information is published in German, sometimes French in the first instance. For those who have not a practical control of German the Hurst "*Dictionary*" is a very valuable book to have. The edition to hand is the second edition.

"*Färbereichemische Untersuchungen*," by Dr. Paul Heermann, Berlin; Julius Springer, 1898; pp. 138. Price, 4 marks. This is a well bound and useful book to the color chemist. In pocketable shape it places in the hands of the chemist the data desired and of frequent application. It is more and more becoming evident that our manufacturers are being driven to

the testing and examination of the dyes, chemicals, and drugs which they use. This book furnishes many short and direct methods. The chapter on the fibers is excellent. The legal test for cotton in woolens is given.

"Mikrochemische Analyse organischer Verbindungen," by H. Behrens. Published by L. Voss, of Hamburg. Price, 4.50 marks.

"Yarns and Textile Fabrics," by Dr. J. Korzfeld, translated by Charles Salter, London. Scott, Greenwood & Co., 23 Ludgate Hill, London, E. C.; pp. xiv., '207. This excellent book, upon a subject in which all manufacturers are necessarily interested, comes to hand in excellent shape. On pages 5 and 6 it says: "In the work are collected all the tests, both of a physical and chemical nature, that can, for technical purposes, be performed on yarn or cloth, so that not only the commercial and textile chemist who has frequently to reply to questions of this kind, but also (and principally) the practical manufacturer of textiles and his subordinates, officials, overlookers, the spinner, the weaver, the dyer, and the finisher are catered for."

"Chemische Technologie der Azofarbstoffe," by Dr. Carl Bülow. Leipzig: Otto Wigand, 1897. The first part, 123 pages, gives a highly scientific treatment of the azo-dyes. The author arranges the azo-dyes into an order and classification which seems to be a step in advance of what has hitherto been habit and custom. As the work is of a highly scientific nature, it is a little beyond the limits of a publication of this nature to give any very extensive review of the work. When the whole work is completed it will again be brought to attention, and will be commended for all those chemists who wish to become perfectly familiar with this, perhaps the most extensive group of all the coal-tar colors.

"Die Appreturmittel und ihre Verwendung," second edition, by Friedrich Polleyn. Vienna, Pesth, and Leipzig: A. Hartleben. This is a brochure of 250 pages on the general subject of the sizing of textiles. It is of a pocket size, and comes along in a set of technological books which have been issued for a long time by the press of A. Hartleben. The formulæ are very well grouped into classes. The more modern sizing methods have received generous notice, and the methods for making fire-proof and water-proof finishes are

stated quite fully. At the end of the volume suggestions for the analysis of sizings are given.

"Sizing Ingredients, Size Mixing, and Sizing," by Hugh Monie, Jr. Manchester, England: Abel Heywood & Son, 56 Oldham Street. 63 pages. Illustrated. Price, \$1.00. The author of this work is well known as the author of "Cotton and the Cotton Fiber," etc., and editor of the *Indian Textile Journal*, Bombay.

"Modern Bleaching and Finishing," by John Heywood, Manchester, England.

"Mechanische Weberei-Praxis," by Franz Donät.—This book of 144 pages is divided into three parts, the first being the mechanical idea of weaving in general; the second part discusses the different looms; and the third section is a specially interesting one, giving the numbering and certain details concerning not only cotton-yarn, but linen, hemp, jute, China-grass, woolen yarns, etc. There is an appendix, giving the tables of calculation and interesting details concerning the mechanism of yarn.

"Bindungs-Lexikon für Schafftweberei."—This book comes bound and, together with the foregoing, should be in the libraries of our different textile schools. The Lexikon contains 160 pages, printed in red and black, giving valuable information in concentrated form for the weaver. The book is handsomely bound in imitation leather, and the presswork is very creditable.

"The Blue Book," 1898 edition, appears in its usual attractive and complete form. This publication is so well known to the trade that it needs nothing more but a notice of its desirability in the columns of the Year-Book.

"Abhandlung über das Färben mit Blauholz-Extract."—This is a publication issued by the Leipziger Farbwerke Paul Gulden Company. It is a small book, but seems to us to be very valuable, giving, as it does, the dyed samples and illustrating the advanced methods of testing for hematine and hematoxylin. It is worth while sending for this book.

"Technical Education."—The Society for the Encouragement of Arts, Manufactures, and Commerce, John Street, Adelphi, London, W. C., England, has published a "Report of the Proceedings of the late International Congress on Technical Education," held in London last June. Among the papers re-

ported may be mentioned "Relations Existing Between the Teaching of Pure Chemistry and Applied Chemistry."

"The Printing of Textile Fabrics: A Practical Manual on the Printing of Cotton, Woolen, Silk, and Half-Silk Fabrics," by C. F. Seymour Rothwell, Lecturer on Calico and Delaine Printing at the Municipal Technical School, Manchester, England. Charles Griffin & Co., Ltd., Exeter Street, Strand, London, 1897, and J. B. Lippincott Company, Philadelphia, Pa. Price, \$6.50. It is said that this book is intended to form a companion volume to Knecht, Rawson, and Loewenthal's Manual of Dyeing. There are over 300 pages, followed by 20 pages of printed and dyed patterns. The following subjects are treated: Introduction. Methods of Textile Printing. Styles. I. Machinery used in Textile Printing. II. Thickeners and Mordants. III. Printing of Cotton Goods. *a.* Bleaching of Cotton Piece Goods for Printing. *b.* The Steam Style. *c.* Colors Produced Directly on the Fiber. *d.* Dyed Styles. *e.* Padding Style. *f.* Resist and Discharge Styles. *g.* Printing of Compound Colorings. IV. Printing of Woolen Goods. V. Printing of Silk Goods. VI. Practical Recipes for Printing. Appendix of Useful Tables.

"Elements of Chemistry," by Rufus P. Williams. New York: Ginn & Co. An excellent work of 400 pages. Mr. Williams says that he wishes the learner "to think scientifically."

"Theoretical Chemistry," by Ira Remsen. New fifth revised edition. Price, \$2. Philadelphia, Pa.: Lea Brothers & Co.

"Recent Progress in the Industries of Dyeing and Calico Printing; Being a Supplement to The Printing of Cotton Fabrics and Dyeing, by Antonio Sansone. Manchester, England: Abel Heywood & Son. A chapter in this book is devoted to the use of colors produced upon the fiber. This important question is treated in detail, and a great many interesting facts are given. One chapter is given to cop-dyeing.

"The Anthracene Dyestuffs." By R. Gnehm. Braunschweig: Vieweg & Son.

"Anleitung zur Qualitativen Chemischen Analyse," by R. Fresenius. Sixteenth edition. Braunschweig: Fr. Vieweg & Son. Price, 12 marks.

"Handbuch der Soda-Industrie und ihrer Nebenzweige," by G. Lunge. Zweiter Band. "Sulfat, Salzsäure, Leblancverfahren."

en." Second edition. Braunschweig: Fr. Vieweg & Son. Price, 30 marks.

"Lehrbuch der Farbenchemie," by G. v. Georgievics. Leipzig: Fr. Deuticke.

"Die Künstlich erzeugten Organischen Farbstoffe," by Rich. Meyer. Braunschweig: Fr. Vieweg & Son.

"Chemie der Organischen Farbstoffe," by R. Nietzki. Berlin: Julius Springer. Second edition. Price, 8 marks.

"Fortschritt der Theerfarbenfabrikation und verwandter Industriezweige," by P. Friedländer. Berlin: Julius Springer. Price, 40 marks.

"Die Industrie der Stärke und der Stärkefabrikate in den Vereinigten Staaten von Amerika und ihr Einfluss auf den Englischen Markt," by O. Saare. Berlin: Julius Springer. Price, 3 marks.

"Technical Lexicon in Four Languages." Vol. I. German, Italian, French, and English. Vol. II. Italian, German, French, and English. Vol. III. French, Italian, German, and English. Vol. IV. English, Italian, German, and French. By Edward Webber. Berlin: Press of Julius Springer. Price, per volume, 75 cents. Each volume contains 8,000 technical words and expressions. The books are not large, and make no pretense to universality, but they are most useful to those who are not trained in the trade phrases and expressions in the technique.

"Year-Book of the Oil, Paint and Drug Reporter." This is a brochure of 83 pages, and is filled to overflowing with interesting statistics and particulars relative to the special field covered by the *Oil, Paint and Drug Reporter*. The tariff acts of 1890, 1894, and 1897 are given in tabular form, in so far as tariff acts refer to oils, paints, chemicals, and dyestuffs.

"Lubricating Oils, Fats, and Greases: Their Origin, Preparation, Properties, Uses, and Analysis," by George H. Hurst. Ludgate Hill, London: Scott, Greenwood & Co., 1896. Price, 10s. 6d. An octavo volume containing frontispiece, preface, table of contents, and subject-matter filling 301 pages, four pages of tables, and an alphabetical index. The work is illustrated with 65 wood-cut illustrations. The text is divided into eight chapters, entitled as follows: 1. Introductory, Oils and Fats, Fatty Oils, Hydrocarbon Oils, Uses of Oils. 2. Hydrocarbon Oils. 3. Scotch Shale Oils. 4. Petroleum. 5. Vegetable

and Animal Oils. 6. Testing and Adulteration of Oils. 7. Lubricating Greases. 8. Lubrication.

"Cotton: Its Uses, Varieties, Fiber Structure, Cultivation, and Preparation for the Market, and as an Article of Commerce; also the Manufacture of Cotton-seed Oil, Cotton-seed Meal and Fertilizers, with Especial Reference to Cotton Growing, Ginning, and Oil Pressing in the United States," by C. P. Brooks. New York: Spon & Chamberlain, 12 Cortlandt Street. This is as attractive a book on a technical subject as it has ever been our pleasure to handle. It is more than ordinarily interesting in its get-up and pictures, and is, in addition, beautifully edited. It is handsomely bound, of almost four hundred pages, and is most profusely illustrated.

"Lehrbuch der Chemischen Technologie der Gespinnstfasern," Part II., by Dr. George von Georgievics. Leipzig and Vienna: Franz Deuticke. The second part of this book contains 354 pages, treating particularly of fibers, bleaching, dyeing, printing, and sizing. The book is an excellent one on all of the operations pursued in bleaching, dyeing, and printing establishments. The mordants are discussed in detail, the dyeing methods, tests of the dyes, and the dyed fiber—altogether it is one of the books which it is advantageous to have.

"Dictionary." The Société Industrielle de Mulhouse having charged itself with the publication of the dictionary of M. Jules Garçon, announces that the book will appear shortly. It will give a methodical arrangement of the different departments concerning textile industry, and in alphabetical order will mention all the researches made in the scientific journals, and the reviews on dyeing and calico-printing. The value of such a work can scarcely be over-estimated.

"Dictionnaire des Altérations et Falsifications des Substances alimentaires, medicamenteuses et commerciales, avec l'indication des moyens de les reconnaître," by A. Chevallier and E. Baudrimont. Seventh edition, by L. Herbert. Vol. II. Paris, 1897. 8vo, with figures.

"Sur le Tannin de la Galle d'Alep et de la Galle de Chine," by E. Manceau. Epernay, 1896. Pp. iv., 147. Price, 6 marks.

"The Diamine Colors." The firm of William J. Matheson & Co., Ltd., has published a book of diamine colors, in the usual generous and handsome style in which their publications appear. It is exclusively occupied with the diamine colors, is handsomely bound, and consists of about 250 pages.

The firm of Victor Koechl & Co. has published a handsome book on the coal-tar colors. The publication follows somewhat the line of the classical Schultz & Julius. The range of colors is very complete, and leaves little to be desired.

"Bleaching and Finishing Machinery for Textile Fabrics."—H. W. Butterworth & Sons Company, Philadelphia, Pa., have issued a trade catalogue of 28 pages, relating to their machinery for bleaching, printing, dyeing, drying, and finishing of textile fabrics. The catalogue contains many illustrations of the machines of this concern.

"A Descriptive Catalogue of Useful Fiber Plants in the World," by Charles Richards Dodge. Washington: Department of Agriculture. 362 pages, 13 plates, and 103 text illustration. This is a descriptive catalogue of the useful fiber plants of the world, including structural and economic classifications of fibers. Mr. Dodge is recognized as an authority in this country upon fiber plants.

"The Cotton-Plant."—The United States Department of Agriculture issues in book form several of the valuable bulletins of their Experiment Stations. The price is 60 cents, which covers the cost of printing and binding.

The State Geologist of Georgia has compiled a report of the water-powers of Georgia. There are many unused water-powers in the Piedmont district of the South Atlantic States. Those interested in the question of mills in that section should obtain this report. The water-powers of Georgia are confined to what is termed the Crystalline Belt of the State.

"Some Notes in Chemical Jurisprudence; An Abstract of Cases of Patent-Law Involving Chemistry." Harwood Huntington, 260 West Broadway, New York. This is a small pamphlet designed to show chemists some of the difficulties which attend the drafting of patents. 25 cents.

NEW PERIODICALS.

The Dyers' Bulletin, a semi-monthly journal devoted to practical dyeing, bleaching, printing, and finishing, and allied industries. The official organ of the Foremen Dyers' Mutual Improvement Association. Price, \$3 per year. 31 South Third Street, Philadelphia, Pa. This is a trade paper, and for all

such there is room, since the field is very large. Dyed samples are given, and the writing is addressed to the dyer.

The Hanna-Schoellkopf Company, of Buffalo, Philadelphia, and New York, issue a four-page trade paper entitled *Dye Topics*. It is a monthly publication devoted to the interests of the American dyehouses; incidentally, also, to the interests of American aniline colors, as sold by the Hanna-Schoellkopf Co. We are pleased to receive the paper, and wish it all success. There is room for all the trade papers, for the field is very vast. The newspaper is one of the most potent means of education, and should receive all encouragement.

A new periodical, the *Revue Générale des Matières Colorantes*, is commenced, and we have in our hands all of the issues of the first year. It would not be easy to commend this journal too strongly to color-chemists. It is not for the dyer, in the ordinary acceptance of the term, but is best adapted to the colorist who has had a training in chemistry. It is well printed, admirably furnished with dyed samples, and we place it in the first rank of all periodicals in the dyeing industry. Among the principal collaborators we find such names as Horace Koechlin, E. Noelting, Albert Scheurer, and Schaeffer, the acknowledged leaders in dyes and their application.

• PART IV.—PATENTS.

No. 575,904—Black Azo Dye, Christopher Ris, assignor to John R. Geigy & Co., January 26, 1897.—A black powder soluble in water with bluish-black color, soluble in concentrated sulphuric acid with blue color, and which is transformed by complete reduction into a colorless solution.

No. 576,222—Rhodamin Dye, Carl Oscar Müller, assignor to Bindschedler, February 2, 1897.—Green, dyeing wool, silk and cotton a fine red, soluble in water, dissolving in alcohol with brick-red fluorescence, and dissolving in concentrated sulphuric acid and in hydrochloric acid with yellow coloration, which turns to red on adding water, the said dyestuff being precipitated from its aqueous solutions by an addition of hydrochloric acid.

No. 576,223—Rhodamin Dye, Carl Oscar Müller, assignor to Bindschedler, February 2, 1897.—Green powder with metallic luster, dyes cotton, silk, and wool in a blue-red, dissolves in concentrated sulphuric acid with yellow coloration, and in water, alcohol, and ether with splendid red coloration.

No. 576,511.—Blue Trisazo Dye, Georg Steinike and Friedrich Schmidt, February 2, 1897.—Gray-black powder soluble in concentrated sulphuric acid with blue color, a violet precipitate on addition of water.

No. 578,093—Blue Dye, Albert Cobenzl, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, March 2, 1897.—Brownish-black powder, soluble in water and alcohol with a pure blue color; in concentrated sulphuric acid with a green color, turning on addition of water first to a pure blue and then to a reddish blue; being soluble in ether, benzene, and ligroine, and separating from its aqueous solution on addition of a caustic alkali or ammonia blue flakes from its color base.

No. 578,432—Dark-Blue Azo Dye, Moritz Ulrich and Johann Nammann, assignors to the Farbenfabriken, vormals Bayer

& Co., March 9, 1897.—A dark powder, soluble in concentrated sulphuric acid with a greenish-blue color, which turns, on the addition of ice-water to this sulphuric-acid solution first into bluish violet, and then darkish violet flakes are precipitated; on the addition of acetic acid (concentrated) to the hot watery solution of the dyestuff a violet solution results.

No. 578,578—Rhodamin Dye, Carl Oscar Müller, assignor to Basle Chemical Works Bindschedler, March 9, 1897.—Rhodamin dye, dyeing mordanted cotton with tannin and tartaric acid. Soluble in water with red coloration, in alcohol with a yellowish fluorescence, and in concentrated sulphuric acid with a yellow coloration, turning to red on addition of water.

No. 578,580—Substantive Cotton Dye, Ferdinand Petersen, assignor to Ferd. Petersen & Co., March 9, 1897.—A black powder, dyes cotton; dissolves in concentrated sulphuric acid with a bluish-green coloration; gives, when hydrochloric acid is added to its aqueous solutions, a reddish-brown precipitate, and, when caustic soda is added to its aqueous solutions, a brown precipitate.

No. 579,773—Red-Blue Disazo Dye, Christian Rudolph, assignor to the firm of K. Oehler, March 30, 1897. A blackish-brown powder with a feeble metallic luster, soluble in water with a violet, and in concentrated sulphuric acid with a blue, color, and which dyes unmordanted cotton a red-blue.

No. 580,186—Blue Dye, Albert Herrmann, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, April 6, 1897.—A copper-colored powder of metallic luster, easily soluble in water, less easily in alcohol, its aqueous solution turning green with mineral acids, but not changing its color with ammonia or soda, turning violet on boiling with soda lye, and dyeing wool and silk a very even and fast blue in an acid bath.

No. 580,187—Fast Blue Dye, Albert Herrmann, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, April 6, 1897. A copper-red powder of metallic luster, easily soluble in water, less easily soluble in alcohol, its aqueous solution turning green with mineral acids and not being changed by ammonia or soda, turning violet when boiled with soda-lye, and dyeing wool and silk a very even and fast blue in an acid-bath.

No. 580,188—Blue Acid Dye, Albert Herrmann, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, April 6,

1897.—A copper-red powder of metallic luster, easily soluble in water, less easily soluble in alcohol, its aqueous solution turning green with mineral acids, but not changing its color with ammonia or soda, turning violet on boiling with soda-lye, and dyeing wool and silk a very even and fast blue in an acid-bath.

No. 582,958—Trisazo Dye, Friedrich Schmidt and Otto Ernst, assignors to the Farbwerke, vormals Meister, Lucius & Brün-
ing, May 18, 1897.—A black dyestuff, forms a grayish-brown powder soluble in water, with a blue-violet color. By adding ammonia the color turns a dull red-violet. It is soluble in concentrated sulphuric acid, with a blue color. By the addition of water the dyestuff is precipitated as gray-violet powder.

No. 582,959—Trisazo Dye, Friedrich Schmidt and Otto Ernst, assignors to the Farbwerke, vormals Meister, Lucius & Brün-
ing, May 18, 1897.—A dyestuff, forms a violet-brown powder of metallic luster and is soluble in water with a bluish-violet color. The color of this solution changes on addition of ammonia into a dull red-violet. It is soluble in concentrated sulphuric acid with a blue color, while by addition of water a reddish-brown precipitate is formed.

No. 583,267—Blue-Green Dye, Jakob Schmidt, and Hugo Weil, assignors to Society of Chemical Industry in Basle, May 25, 1897.—A brown powder with a coppery luster, readily soluble in water, with a pure green-blue coloration, which does not change by the addition thereto of dilute acids.

No. 583,439—Black Azo Dye, Wilhelm Herzberg and Otto Hansmann, assignors to the Actien-Gesellschaft für Anilin Fabrikation, May 25, 1897.—A dark-brown powder of a metallic luster, soluble in hot water with a bluish-violet color, in which solution soda-lye produces a dark greenish-blue precipitate, acids precipitate the coloring acid as dark bluish-violet flakes, said dye being sparingly soluble in alcohol with a bluish-violet color, and in concentrated sulphuric acid with a blackish violet color.

No. 583,634—Black Trisazo Dye, Jakob Schmidt and Karl Jedlicka, assignors to the Society of Chemical Industry in Basle, June 1, 1897.—A dark powder of a light-bronze luster, capable of dyeing unmordanted cotton violet-black to green-black, and which, when dissolved in concentrated sulphuric acid, imparts a blue coloration to the solution.

No. 533,635—Jakob Schmid and Karl Jedlicka, assignors to Society of Chemical Industry in Basle, June 1, 1897.—A powder of bronze luster, insoluble in alcohol, ether, and benzene, soluble in water with a dark blue to green coloration, and capable of dyeing unmordanted cotton in dark-blue to greenish-blue tints fast to light and to alkalies, and which, when dissolved in concentrated sulphuric acid, imparts a blue color to the solution, from which the dyestuff may be precipitated by an addition of water.

No. 584,119—Rhodamin Dye, Carl Oscar Müller, assignor to the Basle Chemical Works Bindschedler, June 8, 1897.—Fine green crystals, soluble in water and alcohol with a fine red tint, dissolve in concentrated sulphuric acid with a yellow tint, which turns to red on addition of water, and dyes cotton, silk, and wool in red tints.

No. 584,981—Blue Dye, Melchior Böniger, assignor to Chemische Fabrik vormals Sandoz, June 22, 1897.—A bronze powder, soluble easily in water with a pure blue shade, not altered by addition of soda, but turns reddish-violet on the addition of caustic soda, soluble in strong sulphuric acid, dyeing unmordanted cotton in a boiling-salt or Glauber-salt bath in bright-blue shades.

No. 585,104—Green Triazo Dye, Carl Jedlicka, assignor to the Society of Chemical Industry in Basle, June 22, 1897.—A powder of bronze luster, soluble in water with a green coloration, and capable of dyeing unmordanted cotton in dark-green to yellowish tints, fast to light and especially to alkalies, and which, when dissolved in concentrated sulphuric acid, imparts a dirty blue-violet color to the solution.

No. 585,934—Blue Dye, Charles de la Harpe, assignor to L. Durand Huguenin & Co., July 6, 1897.—Dyes unmordanted wool and mordanted vegetable fibers, dissolves in concentrated sulphuric acid with a blue coloration, and is soluble in alkalies and alkaline carbonates with a blue-violet coloration.

No. 588,180—Bluish-Scarlet Dye, Ignaz Rosenberg, assignor to Kalle & Co., August 17, 1897.—Brownish-red bronzy powder, soluble in concentrated sulphuric acid with violet coloration, giving an alkaline reduction with zinc-dust, yellow solutions, which quickly turn brown under the influence of the air, dyeing on unmordanted cotton a bright bluish-scarlet.

No. 588,181—Reddish-Violet Dye, Ignaz Rosenberg, assignor

to Kalle & Co., August 17, 1897.—A black-bronze powder, easily soluble in hot water, insoluble in alcohol, soluble in concentrated sulphuric acid with blue coloration, giving, on alkaline reduction with zinc dust, a colorless solution, which turns brown under the influence of air, dyeing unmordanted cotton a bright reddish-violet.

No. 588,182—Mixed Substantive Dye, Ignaz Rosenberg, assignor to Kalle & Co., August 17, 1897.—A black-bronze powder easily soluble in hot water, insoluble in alcohol, soluble in concentrated sulphuric acid with blue coloration, giving, on alkaline reduction with zinc-dust, a slightly yellow solution, which turns brown when exposed to the air, dyeing unmordanted cotton a deep greenish-black.

No. 588,183—Brown Substantive Dye, Ignaz Rosenberg, assignor to Kalle & Co., August 17, 1898.—Dark-brown powder of greenish bronze, easily soluble in hot water, insoluble in alcohol, soluble in concentrated sulphuric acid with reddish-violet coloration, giving, on alkaline reduction with zinc-dust, colorless solutions quickly turning brown when exposed to the air, and dyeing a deep fast brown on unmordanted cotton.

No. 588,397—Gray Dye, Albert Cobenzl, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, August 17, 1897.—A black powder easily soluble in water, difficultly soluble in alcohol, insoluble in ether, benzene, ligroin, etc., and soluble in concentrated sulphuric acid with a green color.

No. 589,766—Red Dye, Jules Ville, September 7, 1897.—Product being of a reddish color, soluble in alcohol and acetic acid, forming red solutions, and in concentrated hydrochloric and sulphuric acids, forming yellow solutions.

No. 590,088—Black Diazo Dye, Carl Bülow, assignor to the Badische Anilin and Soda Fabrik, September 14, 1897.—Soluble in pure sulphuric acid, giving a reddish-blue to bluish-green solution. On pouring into water, yields a blue flocculent precipitate, and on reduction in strong caustic alkaline solution, alpha-naphthylamin.

No. 591,309—Red Dye, Jules Ville, October 5, 1897.—Red coloring-matter resulting from heating a fatty hydrazin with rosolic acid, in hydrochloric and sulphuric acids forming yellowish solutions.

No. 591,616—Trisazo Dye, Melchior Böniger, assignor to Chemische Fabrik, vormals Sandoz, October 12, 1897.—Pow-

ders of slaty to purplish-brown color, dissolving in strong sulphuric acid with greenish-blue color, dyeing unmordanted cotton.

No. 592,608—Red Azin Dye, Bernhard Heymann, assignor to the Farbenfabriken of Elberfeld, October 26, 1897.—A brown powder, soluble in concentrated sulphuric acid with a green color, which turns into blue on the addition of a small quantity of ice-water to the sulphuric-acid solution, and finally from violet to red on the addition of a very large quantity of water, producing on mordanted cotton, as well as on unmordanted cotton, very clear red shades of great fastness to the action of alkali and light.

No. 593,347—Violet Disazo Dye, Fritz Bender, assignor to A. Leonhardt & Co., November 9, 1897.—Dark powders, dyeing cotton without mordant, yielding beautiful red to violet shades, and the solution in concentrated sulphuric acid having a greenish to bluish shade.

No. 593,790—Ulrich & Bammann, assignors to the Farbenfabriken of Elberfeld, November 16, 1897.—Powder with metallic, copper-like luster, soluble in cold water with violet-black color, soluble in alcohol with blue color, soluble in dilute ammonia liquor with blue color, soluble in concentrated sulphuric acid with greenish-blue color, which solution separates, on addition of a small quantity of ice-water, a greenish-blue, flaky precipitate, dyeing wool in acid-baths blue-black shades fast to the action of alkali and acid.

No. 594,105—Sulphur Dye, Henri Raymond Vidal, November 23, 1897.—Coloring-matter capable of directly dyeing cotton fibers a black or brown-black, soluble in sodium sulfid, appearing brown, being of a deep-brown color when unmixed with sodium sulfid.

No. 594,106—Mixed Sulphur Dye, Henri Vidal, November 23, 1897.—Coloring-matter directly soluble in acids, and dyeing animal fibers an intense black, and in part by a body soluble in alkalies, and dyeing vegetable fibers dull blue.

No. 594,107—Thiazin Dye, Henri Raymond Vidal, November 23, 1897.—Method of preparing coloring-matter which consists in heating with sulphur a mixture of paramidophenol and hydroquinone.

No. 594,123—Blue Tetrazo Dye, Christian Heinrich Rudolph and Julius Herbaný, assignors to the firm of K. Oehler,

November 23, 1897.—Soluble in cold water, its aqueous solution not being altered by the addition of properly diluted caustic lye or soda, but yielding a red flocculent precipitate when the lye or soda is added in a concentrated condition, giving, when dissolved in concentrated sulphuric acid, a pure blue solution from which, by the addition of a little water, there are precipitated brown flakes which, by more water, are dissolved with a bluish-red color, dyeing cotton without mordants a bluish-red, which is distinguished by its pure, brilliant shade and fastness to acids.

No. 594,996—Black Azo Dye, Myrtil Kahn and Friedrich Runkel, assignors to the Farbenfabriken of Elberfeld, December 7, 1897.—A brownish-black powder, readily soluble in hot water with a violet-black color, in a twenty per cent. ammonia liquor with a bluish-black color, insoluble in alcohol, in a strong soda-lye and in concentrated hydrochloric acid, soluble in concentrated sulphuric acid with a black color, which turns into bluish-black on the addition of a small quantity of ice, while a violet-black precipitate is separated on the addition of a large quantity of ice to the sulphuric-acid solution, yielding on unmordanted cotton deep bluish shades, which are fast to acids, to alkalies, and to light.

No. 595,021—Black Azo Dye, Kahn & Runkel, assignors to the Farbenfabriken of Elberfeld, December 7, 1897.—Brownish-black powder, easily soluble in hot water, with a reddish brown-black color, and in caustic ammonia, with a violet-black color, insoluble in alcohol, in concentrated hydrochloric acid, and in strong soda-lye, soluble in concentrated sulphuric acid with a reddish violet-black color, which turns into violet-black on the addition of a larger quantity of ice to the sulphuric-acid solution, yielding, on unmordanted cotton, deep-black shades, which are fast to light, to acids, and to alkalies.

No. 595,349—Anthraufin Dye, Robert E. Schmidt, assignor to the Farbenfabriken of Elberfeld, December 14, 1897.—A dark-blue powder, readily dissolving in water with a pure blue color, from which solution it is precipitated by the addition of strong acids, soluble in diluted soda-lye with a pure greenish-blue color, in concentrated sulphuric acid with a yellow color, the color of the sulphuric-acid solution changing into greenish-blue on the addition of boric acid, the solution exhibiting in this state a characteristic absorption spectrum,

dyeing unmordanted wool in acid-baths intense pure and even shades, yielding on chromium mordants even greenish-blue shades, which are fast to light and to fulling.

No. 595,350—Blue Dye from Chrysazin, Robert E. Schmidt, assignor to the Farbenfabriken, December 14, 1897.—A dark-violet powder with a copper-like luster, soluble in water with comparative ease, being precipitated from the watery solution by adding mineral acids, soluble in concentrated hydrochloric acid with a yellow color, from which solution it is precipitated by the addition of water, soluble in concentrated sulphuric acid with a yellow color, which is not changed on the addition of boric acid, soluble in alkalies with a pure greenish-blue color, insoluble in glacial acetic acid and in benzene, dyeing wool in acid-baths beautiful, even, and fast blue shades, and yielding, on chrome mordanted fibers, greenish-blue shades.

No. 596,333—Rhodol Dye, Carl Oskar Müller, assignor to the Basle Chemical Works, Bindschedler, December 28, 1897.—A dyestuff dissolving in water with a yellow-red color, and dyeing wool, silk, and tannin mordanted cotton of yellow-red tints, and which, in the form of its base, is soluble in concentrated sulphuric acid with a yellow color, and gives alkaline alcoholic solutions having a beautiful yellowish-green fluorescence.

No. 596,559—Brown Sulfuretted Dye, Arthur Weinberg, assignor to Leopold Cassella & Co., January 4, 1898.—Brown coloring-matter derived from dinitro-cresol, which is soluble in water in presence of sulfids or strong alkalies, insoluble in alcohol, neutral or acidulated water, the solutions of which dye unmordanted cotton directly brown.

No. 597,983—Black Substantive Cotton Dyestuff, Max H. Isler, assignor to the Badische Aniline and Soda Fabrik, January 25, 1898.—Black substantive coloring-matter for cotton, which can be derived from 1.4' orthodinitroanthraquinone and is soluble in cold water, giving a blue solution, and in concentrated sulphuric acid, giving a grayish-black color, slightly soluble in alcohol with green coloration, insoluble in dilute mineral acids, but soluble in alkalies and alkaline sulfids.

No. 599,425—Blue-Black Alizarin Dye, Robert E. Schmidt, assignor to the Farbenfabriken of Elberfeld Company, February 22, 1898.—A dark powder, difficultly soluble in cold water, readily soluble in hot water with a violet-red color,

soluble in dilute soda-lye with a dull violet-blue color, soluble in a dilute ammonia solution with a violet-red color, which turns into bluish-violet on the addition of an excess of ammonia liquor, easily soluble in hot alcohol with a violet-red color, which changes into violet-blue on adding an excess of ammonia liquor, and into greenish-blue on the addition of a small quantity of soda-lye, being decomposed under regeneration of purpurin when heated with a sulphuric acid of 60° Beaumé, yielding from bluish-gray to bluish-black, even shades on chromium mordanted wool, which shades are fast to light, to fulling, and against the action of acids.

No. 599,426—Green Dye derived from Anthraquinone, Robert E. Schmidt, assignor to the Farbenfabriken, February 22, 1898.—A dark-green powder, dissolving in water with a green color, which changes into yellow on acidulation and adding zinc-dust, the filtered solution reassuming the original green color on exposure to the air, and separating fine needles of quinizarin after heating with a small quantity of sulphuric acid, soluble in alcohol, acetone, chloroform, and benzene with a bluish-green color, soluble in concentrated sulphuric acid with a blue color, which changes into green on the addition of an excess of water, dyeing wool in acid-baths bluish-green shades, which withstand the action of light, of acids, and of alkalis in an excellent manner.

No. 599,427—Green Dye Derived from Quinizarin, Robert E. Schmidt, assignor to the Farbenfabriken of Elberfeld, February 22, 1898.—Green powder soluble in water with a green color, which changes into yellow on acidulating and adding zinc-dust, soluble in alcohol with a bluish-green color, in chloroform and acetone with a green color, in concentrated sulphuric acid with a bluish-green color, which changes into green on the addition of water, dyeing unmordanted wool in acid-baths green shades, which exhibit a great fastness to light, to the air, to acids, and alkalis.

No. 599,532 —Black Trisazo Dye, Christopher Ris, assignor to John R. Geigy & Co., February 22, 1898.—A black powder, soluble in water with black color, forming, with reducing agents, a colorless solution, soluble in concentrated sulphuric acid with a dark-blue color, scarcely soluble in alcohol, and dyeing unmordanted cotton, wool, and silk in deep black shades.

No. 601,033—Blue-Black Mixed Trisazo Dye, Melchior Böniger, assignor to the Chemische Fabrik, vormals Sandoz, March 22, 1898.—Coloring-matter nearly soluble in ethylic alcohol. Soluble in strong sulphuric acid with blue color, and forming, by reducing agents, benzidin, 1.4 naphthalenediamin, and easily soluble sulfo-acids of the naphthalene series.

No. 601,063—Benzidin-Orange, Christopher Ris, assignor to John R. Geigy & Co., March 22, 1898.—A brownish powder which is easily soluble in water with a deep orange color, scarcely soluble in alcohol, soluble in concentrated sulphuric acid with a red-violet color, precipitated by acids from its watery solution in brown flocks, and giving, when treated with reducing agents, benzidin or its homologues.

No. 601,363—Thiazin Dye, Henri Raymond Vidal, March 29, 1898.—Black powder, soluble in concentrated sulphuric acid, in sulfitcs, and soluble in hot alkalies generally.

No. 601,365—Black Dye, Henri Raymond Vidal, March 29, 1898.—Dark, porous mass, insoluble in acid, soluble in alkalies, giving a blue-black color, becoming darker on exposure to the air, and having the property of dyeing directly unmordanted cotton in shades of very deep black.

No. 601,859—Blue Azo Dye, Christian Rudolph, assignor to the firm of K. Oehler, April 5, 1898.—Black-violet powder, with a metallic luster, soluble in water with a blue-violet, and in sulphuric acid with a greenish-blue, color, muriatic acid changing the color of its watery solution into red-violet, and soda-lye into blue, zinc-dust decoloring its alkaline solutions.

No. 11,659—Black Dye and Process of Making Same, Raymond Vidal, April 5, 1898.—Dark mass, insoluble in water or acids, soluble in alkalies and alkaline sulfitcs, the alkaline solutions being readily oxidized on exposure to air, thereby becoming intensely black and capable of dyeing unmordanted cotton fiber in black shades.

No. 602,641—Brown Disazo Dye, Ernst König, April 19, 1898.—Blackish-brown powder, easily soluble in water with a brown color, which solution is not changed either by alkalies or acids, dissolved by concentrated sulphuric acid with an olive-green color, insoluble in ether and benzene or petroleum ether, but soluble in alcohol, and dyeing tanned and untanned cotton, as well as half-wool, brown in an acid-bath.

No. 602,640—Red-Violet Basic Disazo Dye, Ernst König, as-

signor to the Farbwerke, vormals Meister, Lucius & Brüning, April 19, 1898.—A brown powder, soluble in alcohol, ether, benzene, and petroleum ether, and dyeing tanned and untanned cotton, as well as half-wool, a reddish-violet in an acid-bath.

No. 602,639—Coppery-Brown Dye, Ernst König, assignor to the Farbwerke, April 19, 1898.—A black-green powder, easily soluble in water with a reddish yellowish-brown color, soluble in alcohol, insoluble in ether, benzene, and petroleum ether, and dyeing tanned and untanned cotton, as well as half-wool, a coppery brown.

No. 602,638—Basic Yellow Disazo Dye, Ernst König, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, April 19, 1898.—An orange-yellow powder, soluble in water, alcohol, ether, and benzene, insoluble in petroleum ether, dyeing tanned and untanned cotton, as well as half-wool, yellow in an acid-bath.

No. 602,637—Basic Red Disazo Dye, Ernst König, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, April 19, 1898.—A brown-red powder, soluble in water with a blue-red color, soluble in alcohol, insoluble in benzene, ether, or petroleum ether, and dyeing tanned and untanned cotton, as well as half-wool, scarlet red in an acid-bath.

No. 602,544—Blue Azin Dye, Ott & Kroeber, assignors to the Farbenfabriken of Elberfeld Company, April 19, 1898.—Dark powder, soluble in water with a blue color, dissolving in concentrated sulphuric acid with a green color, which turns violet on the addition of a small quantity of ice, while a blue, flaky precipitate is separated on adding a larger quantity of ice, insoluble in a ten per cent. solution of sodium carbonate and in strong soda-lye, dyeing wool in acid-baths bright-blue, even shades, which are fast to acids and alkalies, and also pretty fast to the action of light.

No. 602,540—Violet Dye, Myrtill Kahn, assignor to the Farbenfabriken of Elberfeld Company, April 19, 1898.—Brownish-black powder, with a bronze-like luster, soluble in water with a brownish-violet color, in concentrated sulphuric acid with a blue color, which changes into bluish-violet on the addition of a small quantity of ice, while a blue, flaky precipitate is obtained on adding a larger quantity of ice to the sulphuric-acid solution, dyeing unmordanted cotton violet shades.

No. 603,093—Black Disazo Wool-Dye, Steinike & Schmidt,

assignors to the Farbwerke, vormals Meister, Lucius & Brüning, April 26, 1898.—A dark powder of bronze-like luster, easily soluble in water with a violet color, soluble with difficulty in alcohol with a reddish-blue color, and insoluble in benzene, the aqueous solution of which turns redder on the addition of ammonia, while in concentrated sulphuric acid the dye-stuff is soluble with a pure blue color and is separated on addition of water as a reddish-violet precipitate, and dyes wool blue-black in an acid-bath.

No. 603,090—Brown Trisazo Dye, Krekeler & Martz, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—Dark-brown powder, soluble in water with a reddish-brown color, being dissolved by concentrated sulphuric acid with a blue color, dyeing cotton reddish-brown shades, which, when treated with solutions of chromium and copper salts, become more yellowish-brown and faster to washing and against the action of the light.

No. 603,016—Triphenylmethane-Blue Dye, Arnold Steiner, assignor to Chemische Fabrik, April 26, 1898.—Sulfonated blue-violet dyestuff, dissolving easily in concentrated sulphuric acid with a red-brown shade, in water and ethyl alcohol with a violet shade, and the aqueous solution of which, heated with caustic soda, turns first blue and then almost colorless, and may have the unchanged dyestuff precipitated from it by acids.

No. 603,013—Blue Azin Dye, Ott & Kroeber, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—A dark powder, soluble in water with a blue color, dissolving in concentrated sulphuric acid with a green color, insoluble in a ten per cent. solution of sodium carbonate and in strong soda-lye, dyeing wool in acid baths bright-blue shades, which are fast to acids and to alkalis, and also pretty fast against the action of light.

No. 603,009—Bluish-red Dye, Kahn & Runkel, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—A dark-brown powder, soluble in water, yielding a red solution, from which a black precipitate is obtained on the addition of dilute hydrochloric or sulphuric acid, soluble in concentrated sulphuric acid with a bluish-black color, which turns violet on the addition of a small quantity of ice, while a black, flaky precipitate is obtained on the addition of a larger quantity of ice to the sulphuric-acid solution, yielding, on unmor-

danted cotton, intense bluish-red shades, which, when treated with a solution of diazotized paranitranilin and sodium acetate, change into intense brown shades fast against washing.

No. 603,008—Violet Azo Dye, Myrtill Kahn, assignor to the Farbenfabriken of Elberfeld Company, April 26, 1898.—Black powder of a bronze-like luster, soluble in water with a violet color, and in concentrated sulphuric acid yielding a blue solution, from which a blue, flaky precipitate is obtained on the addition of a sufficient quantity of ice, dyeing unmordanted cotton violet shades, which, when treated with solutions of diazotized paranitranilin and sodium acetate, change into black shades fast to acids and to washing.

No. 602,857—Black Trisazo Dye, Krekeler & Israel, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—A dark powder, dissolving in water with a violet-gray color, soluble in concentrated sulphuric acid with a blue color, yielding on unmordanted cotton violet-black shades, which, when treated with solutions of chromium and copper salts, change into greenish-black fast to washing.

No. 602,858—Brown Trisazo Dye, Krekeler & Martz, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—Dark-brown powder, soluble in water with a yellowish-brown color, in concentrated sulphuric acid with a blue color, dyeing unmordanted cotton yellowish-brown shades, which, when treated with solutions of chromium and copper salts, become more reddish and faster to washing and against the action of light, yielding on wool in acid-baths yellowish-brown shades, which, on a treatment with chromium salts, become fast against milling.

No. 602,855—Blue-black Trisazo Dye, Krekeler & Blank, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—Dark powder with bronze-like luster, dissolving in water with a blue color, in concentrated sulphuric acid with a greenish-blue color, yielding on reduction with stannous chloride in a hydrochloric-acid solution a mixture of reduction products from which tolidin and a diamidonaphthosulfo acid can easily be isolated.

No. 602,856—Black Trisazo Dye, Krekeler & Israel, assignors to the Farbenfabriken of Elberfeld Company, April 26, 1898.—A dark powder dissolving in water, yielding blue solutions, soluble in concentrated sulphuric acid with a blue color,

dyeing unmordanted cotton blue shades, which, when treated with solutions of chromium and copper salts, change into black fast to washing.

No. 603,659—Dark-green Alizarin Derivative, Robert E. Schmidt, assignor to the Farbenfabriken of Elberfeld Company, May 10, 1898.—Dark-green powder, dissolving in water with a green color, yielding, on chrome-mordanted cotton, green shades which are distinguished by their brightness and fastness against the action of light.

No. 603,645—Green Trisazo Dye, Krekeler & Martz, assignors to the Farbenfabriken of Elberfeld Company, May 10, 1898.—A black powder, soluble in water with a green color, in concentrated sulphuric acid with a dark-blue color, from which solution a greenish-black precipitate is obtained on the addition of a sufficient quantity of ice, dyeing unmordanted cotton green shades.

No. 603,646—Gray Trisazo Dye, Krekeler, Martz & Israel, assignors to the Farbenfabriken of Elberfeld Company, May 10, 1898.—A dark-brown powder, soluble in water with a greenish-gray color, in concentrated sulphuric acid with a blue-black color, from which a black, flaky precipitate is obtained on the addition of a sufficient quantity of ice, dyeing unmordanted cotton greenish-gray shades.

No. 603,647—Green Trisazo Dye, Krekeler, Martz & Israel, assignors to the Farbenfabriken of Elberfeld Company, May 10, 1898.—A black powder, soluble in water with a green color, which, on the addition of alkalies, turns into greenish-black, in concentrated sulphuric acid with a blue-black color, from which solution a greenish-black, flaky precipitate is obtained on the addition of a sufficient quantity of ice, dyeing unmordanted cotton green shades.

No. 603,648—Brown Trisazo Dye, Krekeler, Martz & Israel, assignors to the Farbenfabriken of Elberfeld Company, May 10, 1898.—A dark-brown, nearly black powder, soluble in water with a violet-brown color, in concentrated sulphuric acid with a bluish-black color, from which solution a violet-black precipitate is obtained on the addition of a sufficient quantity of ice, dyeing unmordanted cotton violet-brown shades, which, when treated with solutions of chromium and copper salts, become a dark brown with a yellowish hue, and faster to washing and against the action of light, yielding, on wool in acid-baths, dark-brown shades.

No. 603,755—Brown Sulphur Dye, Robert Demuth, assignor to the Farbenfabriken of Elberfeld Company, May 10, 1898.—A brownish-black powder insoluble in water, sodium carbonate, ammonia, and alcohol, soluble with difficulty in dilute soda-lye at ordinary temperature, more easily soluble in hot soda-lye with a greenish-brown color, insoluble, or soluble with difficulty, in concentrated sulphuric acid, easily soluble with a greenish-brown color in alkaline sulfids, thus affording solutions which dye cotton at ordinary temperatures in fast brown shades.

No. 605,119—Diphenylnaphthylmethane Dye, Oscar Nastvogel, assignor to the Farbenfabriken of Elberfeld Company, June 7, 1898.—A brown powder, easily soluble in water with a greenish-blue color, in concentrated hydrochloric acid with a yellow color, in concentrated sulphuric acid with a yellowish color, which changes into green on the addition of a sufficient quantity of ice, being partly dissolved with a reddish-violet color under evolution of dimethylamin when heated with a strong soda-lye, dyeing wool in acid-baths clear, greenish-blue, and even shades fast to alkalis.

No. 605,103—Black Disazo Dye and Process of Making Same, Kahn & Heidenreich, assignors to the Farbenfabriken of Elberfeld Company, June 7, 1898.—A brownish-black powder, soluble in water with a bluish-black color, in concentrated sulphuric acid with a greenish-black color, which changes into violet-black on adding a small quantity of ice, while a violet-black precipitate is obtained on the addition of a larger quantity of ice to the sulphuric-acid solution, dyeing wool in acid-baths black shades fast to milling and against the action of light.

No. 605,568—Anthraquinone Dye, Robert E. Schmidt, assignor to the Farbenfabriken of Elberfeld Company, June 14, 1898.—A blackish powder, which, when rubbed, assumes a metallic luster, insoluble in alcohol, ether, benzene, nitrobenzene, and in glacial acetic acid, soluble in anilin and pyridin with a pure greenish-blue color, in dilute alkalis with a blue color, yielding, with concentrated sulphuric acid a yellow solution, which assumes a blue color on the addition of boric acid, and shows in this state a characteristic absorption spectrum, dyeing unmordanted wool in acid-baths beautiful blue shades fast to light, yielding on chrome-mordanted wool greenish-blue shades very fast to light.

No. 605,921—Blue Anthraquinone Dye, Schmidt & Tust, assignors to the Farbenfabriken of Elberfeld Company, June 21, 1898.—A blackish powder, which, when rubbed, assumes a metallic luster, soluble in anilin, pyridin, and in dilute alkalies with blue color, yielding, with concentrated sulphuric acid, a yellow solution, which assumes a violet-red color on the addition of boric acid, dyeing unmordanted wool in acid-baths beautiful blue shades very fast to light, yielding, on chrome-mordanted wool, greenish-blue shades very fast to light and milling.

No. 606,436—Blue Dye, Fritz Bender, assignor to Farbwerk Mühlheim, vormals A. Leonhardt & Co., June 28, 1898.—Dark powder with metallic luster, soluble in water, giving a pure blue solution, insoluble in spirit, soluble in concentrated sulphuric acid with a pure blue color, and dyeing unmordanted cotton a pure blue shade.

No. 606,181—Blue Tetrazo Dye and Process of Making Same, Johann Bammann, assignor to the Farbenfabriken of Elberfeld Company, June 28, 1898.—A dark powder with a bronzy luster, easily soluble in water with a reddish-blue color, being dissolved by concentrated sulphuric acid with a greenish-blue color, which turns into bluish violet on adding a small quantity of ice, while a bluish-violet, flaky precipitate is obtained on the addition of a larger quantity of ice to the sulphuric-acid solution, dyeing unmordanted cotton violet-blue shades fast to acids and alkalies.

No. 606,193—Yellow-brown Cotton Dye, Robert Demuth, assignor to the Farbenfabriken of Elberfeld Company, June 28, 1898.—A dark-brown mass or powder, readily soluble in water with a reddish-brown color, unalterable by the addition of sodium sulphide, being separated from its watery solution by the addition of dilute hydrochloric or sulphuric acid as a brown precipitate, while sulphuretted hydrogen is set free, yielding on unmordanted cotton, in cold or hot baths, with or without the addition of alkaline sulphid, bright yellowish-brown shades fast against the action of alkalies and light.

No. 606,212—Blue Dye and Process of Making Same, Bernhard Heymann, assignor to the Farbenfabriken of Elberfeld Company, June 28, 1898.—A dark powder, soluble in hot water with a blue color, in concentrated sulphuric acid with a brown color, which changes into yellowish-green on the addition of

a small quantity of ice, soluble in concentrated hydrochloric acid with a yellowish-green color, from which solution a violet, flaky precipitate is obtained on the addition of water, dyeing chrome-mordanted wool bright-blue shades fast against light and milling.

No. 606,264—Dark-blue Tetrazo Dye and Process of Making Same, Johann Bammann, assignor to the Farbenfabriken of Elberfeld Company, June 28, 1898.—A dark powder with a metallic luster, easily soluble in water with a blackish-blue color, in concentrated sulphuric acid with a pure blue color, which changes into violet on the addition of a small quantity of ice to the sulphuric-acid solution, being rediazotizable in solution or when on fiber, yielding on unmordanted cotton blackish-blue shades.

No. 606,295—Blue Azin Dye and Process of Making Same, Ott & Kroeber, assignors to the Farbenfabriken of Elberfeld Company, June 28, 1898.—A darkish-brown powder, soluble in water with a splendid blue color, in concentrated sulphuric acid with a green color, which turns into blue on mixing the sulphuric acid with a large quantity of water, dyeing wool brilliant blue shades fast to the action of alkalies, of acids, and likewise fast against milling.

No. 606,439—Green Disazo Dye, Fritz Bender, assignor to Farbwerk, Mühlheim, vormalis A. Leonhardt & Co., June 28, 1898.—A dark powder, dissolving in water with a green color, being scarcely soluble in spirit, giving, with concentrated sulphuric acid, a violet solution, which, when diluted with water, yields a violet precipitate, said coloring-matter dyeing unmordanted cotton in green shades.

No. 606,438—Blue-black Dye, Fritz Bender, assignor to Farbwerk Mühlheim, June 28, 1898.—Dyestuff soluble in water with a blue color, but scarcely soluble in spirit, and the solution of which in concentrated sulphuric acid has a bluish-green tint, and when diluted with water yields a blue precipitate, the said dyestuff dyeing wool in bluish-black shades.

No. 607,408—Blue Dye for Wool, Emil Elsaesser, assignor to Dahl & Co., July 12, 1898.—A dark-bronze, shining powder, which is readily soluble and takes on a blue color in water, but is with difficulty soluble in alcohol, and, with the addition of hydrochloric acid to the aqueous solution, is rendered somewhat greener, while the addition of soda-lye makes it somewhat redder.

No. 608,024—Brown Azo Dye, Melchior Böniger, assignor to Chemische Fabrik, vormals Sandoz, July 26, 1898.—A brown-black powder, sparingly soluble in ethylic alcohol, easily soluble in hot water with brown color, turning in intense red-brown on addition of caustic soda, soluble in concentrated sulphuric acid with blue-violet color, giving a bluish-brown precipitate on addition of water, and dyeing unmordanted cotton in yellow-brown to blue-brown tints.

No. 608,238—Green Alizarin Dye, Karl Thun, assignor to the Farbenfabriken of Elberfeld Company, August 2, 1898.—A dark-green powder, dissolving in water with a green color, which changes into yellow on acidulating and adding zinc-dust, the filtered solution separating leuco-alizarin bordeaux after heating with a small quantity of sulphuric acid, dyeing unmordanted and chrome-mordanted wool green shades fast to light, yielding on chrome-mordanted cotton green shades, which are distinguished by their brightness and fastness against the action of light.

No. 608,355—Brown-black Sulphur Dye, Henri Raymond Vidal, August 2, 1898.—A dark mass, soluble in alkalies, insoluble in acid, and having the property of directly dyeing unmordanted cotton a brown black.

No. 609,598—Red Dye and Process for Making Same, Henri Raymond Vidal, August 23, 1898.—A vivid red-blue mass, soluble in alkalies, capable of dyeing directly animal and mordanted cotton fibers.

No. 609,131—Mordant, Gottlob Wendler, August 16, 1898.—Mordant, consisting of or containing 60 parts, by weight, of commercial sulphuric acid, 100 parts of calcined alkaline sulphate, such as sodium sulphate, and 15 parts of boracic acid.

No. 608,999—Blue-Black Azo Dye, Bammann & Ulrich, August 16, 1898.—A brownish-black powder of metallic luster, soluble in water and alcohol with reddish-violet color, in ammonia with bright reddish violet, slightly redder than the aqueous solution, little soluble in sodium carbonate at ordinary temperature, more on heating, with a dull reddish-violet color, from which solution brownish-black flakes separate on cooling, scarcely soluble in soda-lye at ordinary temperature, more on heating, with a dull violet color, almost insoluble in dilute hydrochloric and sulphuric acid, even on heating, soluble in concentrated sulphuric acid with a greenish-blue color,

assuming, on addition of ice-water, first, a pure blue, then a reddish-blue color, and finally separating a fine blue precipitate, dyeing unmordanted cotton in an alkaline bath violet-black shades, which, after treatment with nitrous acid and subsequent combination with an alkaline solution of betanaphthol, change into black.

No. 609,327—Blue-black Dye and Process of Making Same, René Bogn, assignor to the Badische Anilin and Soda Fabrik, August 16, 1898.—A new coloring-matter, which can be derived from dinitronaphthalene, and which is soluble in water, gives a blue color in ammoniacal water, and which yields a fluorescent bluish or bluish-green color in concentrated sulphuric acid.

No. 609,352—Blue Dye, Paul Julius, assignor to the Badische Anilin and Soda Fabrik, August 16, 1898.—Blue coloring-matter, readily soluble in water, giving pure blue solutions that are hardly changed in color by the addition of an alkali, and giving a dirty reddish-brown color approaching black in concentrated hydrochloric acid, and a reddish-brown color in concentrated sulphuric acid.

No. 609,998—Sulfonated Monobenzyl-Phthalein Dye, Schmid & Rey, assignors to the Badische Anilin and Soda Fabrik, August 30, 1898.—Dye-stuff which is the alkaline sulfonate of monobenzylated-phthalein dye, dyeing textile fibers in fiery red tints, and being a red powder, which is soluble in water with a red coloration and a yellowish fluorescence, with difficulty soluble in alcohol, and insoluble in ether and benzene.

No. 609,997—Red-violet Dye, Schmid & Rey, assignors to the Badische Anilin and Soda Fabrik, August 30, 1898.—A dye-stuff which dyes wool and silk in acid-bath in fine red-violet tints, dissolves in water with a blue-red color and a yellowish fluorescence, is sparingly soluble in alcohol, insoluble in ether and benzene, dissolves in concentrated sulphuric acid with yellow coloration, and may be precipitated from its solution in concentrated sulphuric acid, by an addition of water, in the form of free sulfo-acid.

No. 610,367—Basic Disazo Dye, Alfred Philips, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, September 6, 1898.—A red powder, soluble in water and alcohol with a red color, soluble with difficulty in benzene, insoluble in ether and petroleum ether, and dyeing wool and cotton cherry-red in an acid bath.

No. 610,349—Violet Azo Dye, Otto Ernst, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, September 6, 1898.—A green-black powder of metallic luster, soluble with difficulty in cold, more easily in hot water, with a red-violet color, soluble in concentrated sulphuric acid with a gray-green color, and giving, by the addition of water, a violet precipitate, dyeing wool violet in an acid-bath, and producing, by treatment with chromates or chromic acid, an even, saturated brown color of beautiful shade, fast to milling and light.

No. 610,345—Red Acid Dye, Bernhard Deicke, assignor to the Farbwerke, vormals Meister, Lucius & Brüning, September 6, 1898.—A dark powder, soluble in water and alcohol with a red color, almost insoluble in ether, benzene, and ligroin.

No. 610,541—Black Dye, George Kalischer, assignor to Cassella & Co.—A black mass, easily soluble in water with a blue-black color, being precipitated from its solutions by acids, and dyeing unmordanted cotton directly in an alkaline bath, without the help of oxidizing agents, a deep blue-black.

PART V.—NEW DYES.

SYNTHETIC INDIGO.

The Société Industrielle de Mulhouse has granted two medals of honor in connection with the recent production of artificial indigo. One of these medals was given to the Badische Anilin & Soda Fabrik, with the words, "The Industrial Society rarely has had occasion to give a prize so well merited, and rarely have the conditions been fulfilled in a manner so complete; upon this point there has been one voice in the Committee of Chemistry."

The other medal of honor has been given to M. Von Baeyer, and it is the prize known as the medal of honor for the synthesis of one of the natural coloring principles which has an industrial application. The words in connection with this, "The Society thanks you at one and the same time for your work in pure and applied science." It is with great difficulty that one unfamiliar with the enormous amount of work required in the synthesis of indigo appreciates the beauty of the successful production of indigo. It is true that there have been hitherto sold on the market compounds which under certain conditions could be used for the making of an indigo. Two of these, which were on the market for some time, demanded the use of subsequent chemicals to fully develop the color. To-day the Badische Anilin & Soda Fabrik sells an indigo which on analysis gives 98 and 99 per cent. of pure indigotin. Moreover, it is a constant composition, which is a fact of vast importance to those using indigo.

FARBENFABRIKEN OF ELBERFELD.

Acid Violet 3 B extra.

Acid Violet 4 B extra.

Acid Violet R extra.

Acid Violet 2 R extra.
 Acid Violet 3 R extra.
 Acid Violet RX.
 Acid Violet 3 BX.
 Acid Violet 4 BX.
 Alizarine Green CG extra.
 Alizarine Green CK.
 Alizarine Viridine Paste.
 Alizarine Green CE Paste.
 Alizarine Brown RB.
 Benzo Chrome Black Blue.
 Benzo Chrome Black Blue B.
 Benzo Green G.
 Brilliant Alizarine Blue D Paste.
 Diamond Flavine G.
 Diazo Black 3 B.
 Diazo Black BHN.
 Double Ponceau 2 R, 3 R and 4 R.
 Phenol Black SS.
 Pluto Black G.
 Pluto Black R.
 Sulphon Acid Blue B.
 Sulphon Acid Blue R.

KALLE & Co.

Biebrich Alizarine Black 4 B N patented.
 Biebrich Acid Blue G patented.
 Heliotrope 2 B.
 Naphtamine Blue 2 B patented.
 Naphtamine Blue 2 R patented.
 Naphtamine Blue 3 R patented.
 Naphtamine Blue 5 B patented.
 Naphtamine Indigo Blue 2 B patented.
 Naphtamine Indigo Blue 2 R., patented.
 Naphtamine Indigo Blue G patented.
 Salicine Yellow.
 Tolan Red B patented.

JOHN J. KELLER & Co.

Acid Grenadine.
 Acid Grenadine B.

Diphenyl Black R.
Diphenyl Blue E F S.
Diphenyl Blue Black.
Diphenyl Brown.
Diphenyl Brown R.
Diphenyl Brown R R.
Diphenyl Fast Black.
Diphenyl Fast Yellow G.
Diphenyl Indigo Blue.
Diphenyl Red.
Diphenyl Violet R.
Diphenyl Yellow.
Eriocyanine.
Erioglaucine.

VICTOR KOECHL & Co.

Alizarine Black R G (Cotton).
Alizarine Black D R.
Alizarine Blue D G.
Alizarine Blue D R (Cotton).
Azophor Black S (Printing).
Azophor Orange (Printing).
Blue Rougeant, P P W (Printing).
Cœrulein B W paste.
Dianil Black G.
Dianil Black R.
Dianil Blue B G.
Dianil Blue R.
Fast Silk Gray O (Silk).
Also the series of Janus Colors.

NEW YORK & BOSTON DYEWOOD COMPANY.

Brilliant Bordeaux S mixture.
Columbia Brown R.
Columbia Black F B.
Chromanil Black R F.
Chromanil Brown G G and R.
Sambesi Black B R.
Sambesi Black D and 3 B.
Wool Black 4 B F.

Wool Black B.
 Wool Black G R.
 Wool Jet Black 2 B and 3 B.

WILLIAM J. MATHESON & Co., LTD.

Alizarine Black R patented.
 Alizarine Black S patented.
 Alizarine Black T patented.
 Alizarine Lanacyl Navy Blue B patented.
 Anthracene Acid Black S T.
 Anthracene Acid Brown N.
 Anthracene Acid Brown S W, patented.
 Bismarck Brown—Yellow Shade.
 Diamine Azo Black B.
 Diamine Azo Black B patented.
 Diamine Azo Blue, No. 51, patented.
 Diamine Azo Blue, No. 54, patented.
 Diamine Azo Blue, 72,122, patented.
 Diamine Azo Blue R R.
 Diamine Black B.
 Diamine Blue, No. 50, patented.
 Diamine Blue, No. 52, patented.
 Diamine Blue, No. 53, patented.
 Diamine Blue, No. 55, patented.
 Diamine Blue S R X, patented.
 Diamine Blue Black R.
 Diamine Brown 2 O patented.
 Diamine Brown, No. 30a, patented.
 Diamine Brown, No. 31, patented.
 Diamine Brown, No. 32, patented.
 Diamine Brown, No. 33, patented.
 Diamine Brown, No. 34, patented.
 Diamine Brown, No. 35, patented.
 Diamine Brown, No. 36, patented.
 Diamine Brown, No. 37, patented.
 Diamine Catechine G patented.
 Diamine Catechine B.
 Diamine Nitrazol Brown B patented.
 Diamine Nitrazol Brown B D patented.
 Diamine Nitrazol Brown G patented.

Diamine Nitrazol Brown R D patented.
Diamine Nitrazol Black B.
Diamine Red 10 B.
Diamineral Blue R patented.
Diaminogen B R.
Excelsior Lake Scarlet J N.
Fast Acid Green B.
Formyl Violet 8 B patented.
Gloria Black B patented.
Immedial Black V extra patented.
Lake Scarlet F R.
Lake Scarlet F R R.
Lake Scarlet F R R R.
Lanafuchsine S B.
Lanafuchsine S G.
Milling Yellow I I.
Naphtindone T patented.
Oxy-Diamine Black A patented.
Oxy-Diamine Black A M patented.
Oxy-Diamine Black A T patented.
Oxy-Diamine Black B G patented.
Oxy-Diamine Black R R patented.
Oxy-Diamine Blue 3 R patented.
Oxy-Diamine Orange G patented.
Oxy-Diamine Orange R patented.
Oxy-Diamine Yellow G G patented.
Scarlet E C.
Wool Red B.

WILLIAM PICKHARDT & KUTTROFF.

Alizarine Blue N A extra.
Alizarine Blue N G G.
Alizarine Yellow L W.
Cotton Black B.
Neptune Green.
Nile Blue R.
Palatine Black.
Palatine Scarlet.
Sorbin Red.
Union Black B B.
Wool Blue.

READ HOLLIDAY & SONS, LTD.

Acid Black, 5,534 and 5,535.
 Cross Dye Black.
 Cross Dye Drab.
 Naphthol Black 4 B.
 Titan Blue 3 B.
 Titan Blue R.
 Titan Brown R.
 Titan Como S.
 Titan Navy R.
 Titan Red.
 Titan Red 6 B.
 Titan Sky Blue.
 Titan Yellow R.
 Titan Yellow Y.
 X. L. Blue.
 X. L. Red.
 Vat Red Paste.
 Vat Red Powder.

SYKES & STREET.

Brown S. D. M.
 Brown S. D. P.
 Induline 3 B.
 Rouge de Lyon A.
 Soudan Black, 1, 2, and 3.
 Soudan Black B.
 Soudan Black R.
 Soudan Black 2 R.
 Thio Catechine, Nos. 2, 3, and 4.
 Violet A P F.
 Violet Blue A P.

PART VI.—NEW PROCESSES.

COP-DYEING.

The real key to the difficulty is in matching lots dyed at different times. To a layman nothing appears easier than to obtain the same color by taking precisely the same amounts of chemicals and the same weight of goods, and in this way try to obtain uniform dyeings, day after day, and week after week. It is a fact, however, that no one who has had any experience in colors will gainsay, that it is impossible, even where the most conscientious care is used, to get identically the same results day in and day out. All of this seems absurd to the theorist, but it is a sad fact that the dyer cannot get uniform shades even when using, to the very best of his ability, identically the same amounts. Therefore, as the order always comes from the commission house, "Dye THIS red," and not "Dye A red," it is not possible to make a commercial success on a commission basis of a process which does not enable the dyer to return the goods to the commission house dyed precisely and identically THIS red. Per contra, if a mill uses up its own dyeings, the dyeing of the cops can be used to effect a very material economy.

Another cause for a great deal of trouble in carrying out to a practical success the idea of cop-dyeing is that, if the cops are handled in the least roughly or squeezed so that the shuttling is in the least delayed, there is a loss, because in this country, where several looms are kept in operation by one hand, this operation of shuttling must be easily done, or the whole bobbin is thrown in the waste heap. We have not the careful labor in this country, and it is made more careless because of the migration of mill help from one manufacturing center to another. Abroad this migration is not so easy, and consequently the mill hands stay longer in one place and get used to a certain kind of work.

To enumerate cop-dyeing machines: The first, that of M. Charles Weber; second is a cop-dyeing machine used in Providence; and third is mentioned in the Consular Reports for September, 1892, page 152; Mr. C. R. English, of Boston, is agent, we believe, for more than one cop-dyeing machine, and should be addressed.

Perhaps the newest machine in cop-dyeing is the Hallewell machine, for which R. B. Maclea, 83 Worth Street, New York City, is the agent.

A late number of the *Textile Manufacturer* has an article on an improved cop-dyeing machine made by Mr. Beaumont, of Stockport.

DYEING IN SLUBBING AND ROVING.

An English patent has been taken for bleaching and dyeing in the various stages of manufacture. The idea is to use perforated bobbins placed on the frames, and these specially constructed bobbins are so arranged that they screw on to large pipes, through which come bleach and dye liquors. The idea is old.

SLIVER DYEING MACHINES.

A very handsome announcement appears in a recent issue of the *Textile Manufacturer* of a continuous sliver dyeing machine, manufactured by the firm of Mather & Platt. The idea is to pass the slivers six at a time, between perforated bands, which prevent disturbance of the fibers. These bands come together over the slivers, and then bands, slivers, and all pass through the different dyeing solutions, either hot or cold. The whole machine shows an enormous amount of labor, thought, and enterprise. It is a matter of regret to say that we do not think there is anything in it, so far as commission work is concerned.

PATENT DYEING PROCESSES.

Sprague's patent dyeing apparatus for dyeing raw stock gives excellent results. The first experiments have completely discouraged some, but pertinacity will make the process do good work.

The Bentz-Edmeston continuous kier has been favorably

reported upon by some firms using it. The process is based on the employment of caustic soda in a machine.

The electrical bleaching process of Gebaur-Knofler has been used in Berlin. The theory is the electrolysis of a solution of common salt.

CALICO PRINTING—DOUBLE WIDTH.

The Scotch printers have been early in the field with a method for double printing, and the production is very economical, being double what the ordinary machine will turn out. The process is known as the "split" trade. A machine printing "splits" is one that turns out the double width of cloth, printing practically two pieces at one time. In order to do this, the machine is made only twenty inches wider than the ordinary one. The owners of the machines that print but one width are practically obliged to take 50 per cent. of their previous prices in order to compete with the mills owning "split" machines.

COUPLING PROCESS.

Every cotton dyer is familiar with the now well-known process of dyeing and then, in subsequent baths, diazotizing with sodium nitrite and developing with such substances as naphthol, phenylene diamine, para-nitraniline, etc.

There has been placed on the market "Nitrazol C," a ready prepared form of diazotized para-nitraniline, which only requires dissolving in water to be ready for use. To distinguish this process from other methods of dyeing cotton, it may be very conveniently called the "Coupling Process."

In working with para-nitraniline: Take 2 pounds para-nitraniline C. and dissolve in $1\frac{1}{2}$ gallons of boiling water and $\frac{1}{2}$ gallon of hydrochloric acid. Stir until a complete solution is obtained, then add $3\frac{1}{2}$ gallons of cold water, and allow the mass to stand until thoroughly cold; add $1\frac{1}{8}$ pound of nitrite of soda dissolved in $\frac{2}{3}$ gallon of cold water. In from fifteen to twenty minutes the diazotization of the para-nitraniline will be complete, when sufficient cold water is added to make up to 20 gallons. This is kept as a stock solution, and if kept in wood or earthen vessels, not exposed to heat or light, will keep for two or three weeks. To make the coupling

bath, take, for 100 pounds of cotton, 10 to 20 gallons; mix with enough water to work the cotton in handily, and add for every 10 gallons of the stock liquor used 2 pounds of acetate of soda. The first-named quantity is used for producing dark shades.

With Nitrazol C.: For 100 pounds of cotton, take from 4 to 8 pounds Nitrazol C. and dissolve in cold water; add, for each pound of Nitrazol used, $\frac{1}{4}$ pound of refined alkali and $1\frac{1}{2}$ ounce acetate of soda, both previously dissolved in water. When light shades are being produced, 4 to 5 pounds of the Nitrazol will be found sufficient; dark shades will take from 6 to 8 pounds.

Not all of the Diamine Colors are suitable for this coupling process, the following being those best adapted: Diamine Jet Black OO, patented; Diamine Jet Black CR, patented; Diamine Jet Black RB, patented; Oxy-Diamine Black, SOOO, patented; Diamine Brown V, patented; Cotton Brown N, Cotton Brown A, Diamine Blue Black E, patented; Diamine Black BO, patented; Diamine Gray G, patented; Diaminogene extra, patented; Diamine Bronze G, patented; Primuline, Diamine Orange D, Diamine Fast Yellow A; Diamine Brown M, patented; Diamine Black RO, patented; Diamine Nitrazol Brown Y, patented; Diamine Nitrazol Brown B, patented; Diamine Nitrazol Brown BD, patented; Diamine Nitrazol Brown GD, patented; Diaminogene B, patented.

DEVELOPERS.

PHENYLENE DIAMINE.

This is a product of almost chemical purity, manufactured especially for the production of fast dyeing with Diamine Colors, and is used for the development of blacks with Diamine Blacks RO, BO, BH, Diamine Jet Black SS, Diamine Blue Black E, Diaminogene Extra, Diaminogene B, and Diamine Black NB, and for the development of browns with Diamine Cutch, Diamine Browns M and V. One-half per cent. of phenylene diamine is sufficient for the development of full shades.

NAPHTHYLAMINE ETHER N, PATENTED.

This product is used for the development of fast dyeings with the Diamine Colors; the shades produced tend toward

blue tones, and it is especially valuable for the production of bright blues. It is used chiefly for the production of blues from Diamine Blacks RO, BO, BH, Diamine Blue Black E, Diaminogene Extra, Diaminogene B, Diamine Azo Black B and R. The blues thus produced are unsurpassed in fastness and brilliancy. About 1 per cent. is sufficient for average shades.

FAST BLUE DEVELOPER AD, PATENTED.

This developer gives shades with the Diamine Colors, similar to those produced with naphthylamine ether N, but of a somewhat redder tone. It has the additional value of producing fast shades with the Diamine Blues. The same quantity is necessary as with naphthylamine ether N.

BLUE DEVELOPER AN, PATENTED.

Very similar in results to naphthylamine ether N.

NITRAZOL C, PATENTED.

This product is diazotized paranitraniline in a dry, powdered form. It is stable at a temperature below 85° F., and is well adapted for use in dye-houses where facilities for diazotizing cannot be obtained. It is liable to decomposition at a temperature of about 85° F., and should be kept in a cool, dry place. For use, 5 per cent. Nitrazol C are dissolved in cold water, and 1/10 per cent. of sodium acetate and 1/4 per cent. of soda ash, of the weight of the Nitrazol, are added. The goods, dyed with the proper Diamine Colors, are worked in this cold solution. This method is used chiefly in producing browns when coupled with Diamine Jet Blacks OO, RB, CR, Oxy-Diamine Blacks SOOO, Diamine Brown V, and Cotton Browns N and A. Also with Diamine Blue Black E, Diamine Black BO, Diaminogene, Primuline, Diamine Orange D, and Diamine Fast Yellow A.

AZOTOL C, PATENTED.

This product possesses the valuable property of producing blacks when diazotized and combined with beta naphthol, in exactly the same manner as reds are produced from diazotizing paranitraniline C. It is therefore very valuable for the production of black and red shades upon a bottom of beta naphthol, when used in conjunction with paranitraniline C. It is especially useful in printing, as the padded goods can be

printed red and black with the two above diazotized compounds. The blacks thus produced are exceedingly fast to light steaming and washing.

To diazotize it, 26.5 parts are dissolved in 125 parts of hot water and 18.2 parts of muriatic acid 21° Beaumé, then cooled with 200 ice and 4.5 parts of nitrite of soda dissolved in 15 parts of water slowly added. The best method of making the printing paste is to add to the above 300 parts of thickening M, and before use add 6.5 parts of acetate of sodium, dissolved in 20 parts of water. The thickening M is 100 parts of wheat-flour, 225 parts of water, 150 parts of tragacanth thickening (165:1,000) and 30 parts of acetic acid, 11° Twaddle, boiled together.

AMIDO NAPHTHOL BD, PATENTED.

This product produces blacks when treated with diazotized paranitraniline C, in the same manner as reds are produced from beta-naphthol. It is very valuable in producing red and black effects in printing in conjunction with beta-naphthol. The goods are printed with beta-naphthol for red and with amido naphthol BD for black, and the goods thus printed are passed through a solution of diazotized paranitraniline C. The shades are exceedingly fast to light, steaming and washing.

AMIDO NAPHTHOL 3B, PATENTED.

This is similar in its properties and method of application to amido naphthol BD, the shades of black being more of a blue tone than those of the BD brand.

RED DEVELOPER C, PATENTED.

This product possesses the properties of beta-naphthol, when combined with diazotized paranitraniline C, except that the shade is of a much bluer tone. Shades resembling Turkey red can be produced by adding about 10 per cent. of red developer C to the beta naphthol for padding. The fastness of the red thus produced is not lessened in any degree.

PARANITRANILINE RED.

Make up a bath of 1 per cent. of paranitraniline, 5.5 per cent. of nitrite of soda, 2.5 per cent. of hydrochloric acid, 21° Beaumé, and 2 per cent. of acetate of soda. Enter the goods, wash, dry, enter into a solution of beta-naphthol. While para-

nitraniline gives a red or rose according to the concentration, sometimes even a brown, meta-nitraniline will give an orange, dianisidin blues and violets.

In order to obtain a bright color with paranitraniline red it is necessary that the naphthol-prepared cloth should retain its original white look before it goes into the diazotizing bath, otherwise a dull and uninteresting color will result. Beta-naphthol absorbs oxygen from the air and becomes brown. To avoid this defect, Lauber and Caberti patented the idea of adding antimony salt to the naphthol solution, keeping the antimony in the solution by the addition of glycerine. The antimony salt is fluoride of antimony and potassium chloride double salt. Knecht recommends the use of antimony hydrate; A. G. Green states that one part of tartar emetic to each four parts of beta-naphthol is effectual. The latter authority also states that equal weights of glycerine and naphthol effectually prevent the development of the brown color.

Inasmuch as oils add greatly to the brilliancy of the color obtained Turkey red oil has for a long time been employed; Messrs. Meister, Lucius & Brüning have now introduced para acid (ricinoleic acid), para soap PN (ricinoleate of ammonia), and para soap RN (ricinoleate of soda), as substitutes for Turkey-red oil.

It will be just as well to mention the different forms in which paranitraniline red is sold. Paranitraniline $C_6H_4 \begin{matrix} \swarrow NO_2 \\ \searrow NH_2 \end{matrix}$ or its azo derivative are sold in several different forms for the production of azo red upon the fiber. These are:

First, Paranitraniline (free base).

Second, Paranitraniline hydrochloride.

Third, Paranitrodiazobenzene chloride.

Fourth, Paranitrophenyl-nitrosamine.

No. 1 requires the addition of hydrochloric acid and nitrous acid; the second of nitrous acid alone; the third of alkali; the fourth of acid.

Since it has been proved that paranitraline red can be successfully dyed without the employment of ice, its application has very rapidly extended. To get along without the low temperature for which ice has been employed, the usual sodium acetate solution must not be added to the diazotized solution until the latter is required for use.

PARANITRANILIN RED DISCHARGE.

Caustic soda is said to lift the red, and that the complex produced can be best removed by water-glass solution.

If glycerin, glycerides, chlorhydrine, or similar substances be added to tin salts, the discharge can be readily effected.

The ager must be free from oxygen; hence, in presence of aniline black as part of the design, the goods are allowed to hang overnight in an oxidation chamber at 36° to 40° Centigrade before steaming. After steaming, the goods are immediately passed through a tepid bath (40 grms. of strong hydrochloric acid per liter) to remove the different decomposition products formed during the process. Then they are well washed to remove all traces of tin.

When there is a white discharge only, the goods may with advantage be passed through an acidified solution of bleaching powder. This still further improves the white, and the red not only does not suffer, but is brightened by the chlorination. In lieu of a white effect, a colored ground can be obtained by adding to the white discharge (Azorongeant PN of Koechl) gallocyanin, gallamin blue, etc.

PARANITRANILINE C.

Dissolve 10½ pounds of paranitraniline C in 4½ gallons of hot water and 2½ gallons of muriatic acid, 32° Twaddle. When completely dissolved, add, while briskly stirring, 14½ gallons of water. Let the resulting paste cool off completely overnight, then add all at once, and under brisk stirring, a solution of 5½ pounds of nitrite of soda, dissolved in cold water. Dissolve 11 pounds of beta-naphthol together with 11 pounds of soda-lye, 75° Twaddle, and 11 pounds of soda in about 11 gallons of water, add 6½ pounds of Turkey-red oil, and the base (according to shade required, a very large excess of carbonate of lime or barytes), as well as a sufficient quantity of cold water. Then, while briskly stirring, let the above paranitraniline solution run in. The precipitate forms at once; it is then washed twice with a great deal of water.

RENDERING DIAZO COMPOUNDS STABLE.

This can be done in many cases by mixing with such matter as sulphuric acid, alum, or Glauber's salts.

ALPHA-NAPHTHOL IN BETA-NAPHTHOL.

Alpha-naphthol in the beta-naphthol exerts a detrimental effect in the coloring of the paranitranilin red. In order to prove the amount of alpha-naphthol in beta-naphthol, 0.144 gr. is dissolved in a graduated cylinder in 5 cc. of pure alcohol, and 15 cc. of toluol is added; 0.14 gr. of paranitranilin red is dissolved in 9 cc. of dilute hydrochloric acid, and after this is cold it is diazotized with 1 cc. of normal sodium nitrate solution and then added to the naphthol solution. This is well shaken up and water is added, the two layers which are formed are divided by a separatory funnel, and the color of the toluol solution is compared with a solution which is made in the same way from beta-naphthol containing a known amount of alpha-naphthol. It is possible in this way to determine 0.01 gr. of alpha-naphthol.

REACTION TO DISTINGUISH BETWEEN ALPHA-NAPHTHOL AND BETA-NAPHTHOL.

Cold, saturated, aqueous solutions of the naphthols, made by trituration in a mortar, will give a distinctive coloration with sodium hypobromite. This latter is obtained by mixing 30 cc. of caustic soda of 36° Beaumé with 100 cc. of water and shaking with 5 cc. of bromine. To 10 cc. of the naphthol solution add 2 drops of the hypobromite, when alpha-naphthol will turn to a dirty violet coloration or precipitate, while beta naphthol gives a yellow.

CROSS DYEING.

Wool mordanted with bichromate, woven up with wool which has not been mordanted, and dyed with logwood, the mordanted wool colors black, while the unmordanted is but slightly tinged. If the dyed fabric is topped with a violet dye, as methyl violet, the cloth will have the appearance of a black and violet weave.

The alizarines are ready for this sort of work, for the reason that, if properly done, after dyeing with alizarine, the bath is so thoroughly exhausted that it can be used for dyeing the second color direct; for instance, a blue-red or a yellow-green weave is obtained by dyeing first with alizarine blue, subsequently with some ponceau or bordeaux.

A similar effect can be also secured in cotton. A cotton yarn mordanted with tannin and antimony, and woven up with unmordanted yarn and then dyed with a basic color, as methylene blue, and after dyeing washed and then dyed again with a substantive color, as benzopurpurine, a cross color effect is established which is very attractive. Alizarine red gives a bordeaux upon chrome, a bright red with alum, and lilac with iron. Yarn treated with these mordants woven up with unmordanted yarn and then dyed in alizarine gives a quadruple-colored fabric.

Again, in the instances of unions, the wool may be dyed with acid fuchsin, azofuchsin G, scarlet 3R, azocochenille, orange GT, acid violet 4B extra, 5B, cyanol, cyanine Victoria blue, and indigo extract. Use 4 per cent. of sulphuric acid, with 5 to 10 per cent. of Glauber's salts. If the cotton becomes colored much, enough sulphuric acid has not been used. Or the cotton may be mordanted with sumac for three or three and one-half hours. Fuchsin, safranin, auramin, methylene blue, and basic colors are applicable. If Diamine Colors are employed, a full amount of Glauber's salts must be used. To insure an alkaline bath, soda can be placed in the bath. Goods should be entered cold, and worked up very slowly in temperature. If toward the end a dye is needed to color wool and not cotton—supposing that the wool has not taken up as much color as the cotton—then use orange extra, crystal OR, azo-red, formyl violet S 4B, acid green extra concentrated B, alizarine black, or naphthol blue-black.

The Diamine Colors may be divided into:

(a) Those which dye the cotton darker than the wool—*e.g.*, diamine violet N, diamine sky blue, diamine new blue, diamine black BH, diamine oranges G and D, diamine fast yellow A, diamine brown V, etc.

(b) Those which dye the wool darker than the cotton—*e.g.*, diamine brown B, diamine gold, diamine bronze G, diamine blue 3 R, diamine scarlet, etc.

(c) Those dyeing the cotton and wool to the same shade—*e.g.*, diamine dark blue B, diamine brown 3G, diamine brown N, union black S, diamine red 5B, diamine fast red F, diamine Bordeaux, diamine green.

Wool and cotton can be dyed different shades in one bath. Colors must be used which will dye cotton in acid-bath without staining the wool, as well as wool dyes which will not dye the cotton. Azo red A, acid green extra concentrated, crystal scarlet OR, brilliant orseille, formyl violet, naphthol black, orange crystals, naphthol yellow, and cyanole extra will do the latter work. Diamine Colors which dye both fibers in an acid-bath are used. Diamine brilliant blue, diamine sky blue; then, if for instance, acid scarlet be mixed with diamine blue, a brown and blue shot effect is produced.

COTTON BLEACHING BY ELECTROLYSIS.

A process has been recently devised, and perfectly satisfactory results are said to have been achieved. Cotton yarn is packed in liquors, prepared in a vessel known as the electrolyzer. Through this a solution of rock-salt flows, and at the same time an electric current is passed through the liquid. This bleaching liquid is kept in closed vessels until required. Although the first expenditure is large, the cost of working is said to be low. Two men should bleach and wash off 1,500 pounds of yarn a day.

APPLICATIONS OF ELECTRICITY.

Dr. Goeppelsroeder, in Mulhouse, developed ten years ago, and in the Manchester Exhibition of 1889 showed a booth full of samples of dyeings produced by electricity.

It now appears that the Society of Chemical Industry in Basle produces colors by electrizing certain compounds. Furthermore, certain yellows are now obtained by the Badische Anilin- and Soda-Fabrik.

Chlorine obtained by electricity from salt is now being marketed by Arnold, Peck & Co., of New York and Providence, and seems to be of excellent grade. The best bleach will run 35.6 per cent. of chlorine.

The chloride of lime which is now being manufactured in this country gives excellent tests for chlorine strength; the

Niagara brand runs 35.6. Two imported bleaching powders gave 35.3 and 35.6 chlorine strength. These figures given are each the average of three separate determinations. One French bleach gave a chlorine strength of 31.47 per cent.

LIQUID SULPHUROUS ACID.

When liquid sulphurous acid can be obtained at three cents a pound, there is small excuse for manufacturers who fail to get a good white.

SIZINGS.

Water-proof: Saturate with gelatine, to which 2 per cent. chrome has been added. Formaldehyde is useful.

Jute bags are sized with milk of lime, and then a mixture of 3 parts oil and 1 part of paraffine.

Another bagging sizing can be made with acetate of lime and Iceland moss.

OIL-STAINS.

The Société Industrielle de Mulhouse has given a medal to the inventor of a solution for the removal of oil-stains from cloth. The composition is as follows:

Water	50	parts.
Soap	3.6	"
Ammonia or ammonia soap.....	0.9	part.
Soda	1.8	"
Oil, such as paraffin-oil, toluidin, anilin, and phenol.....	0.5	"

THE QUESTION OF LIME-STAINS.

The question of lime-stains in goods is of perennial interest, and a dyer has to be eternally vigilant to avoid trouble. A sure way of introducing lime into goods is to have a deficient souring; unless the goods from the lime boil are passed through an acid of sufficient strength, using about two degrees Beaumé, depending upon the weight of the goods, lime-stains are sure to be in the fiber. One of our large bleacheries found out that although the sours were two degrees Beaumé, the acid strength as analyzed in the laboratory was only 0.3 of a degree. The specific gravity was raised by the soluble cal-

cium salts, and the reading by the glass was wholly misleading. Bleacheries should have test solutions to determine the true strength of their acids, chloride of lime, etc. These are readily made for the acids by simply making alkali of proper strength, and adding to it an indicator such as methyl orange; this alkali should be made such a strength that equal volumes of the test solution will exactly neutralize equal volumes of the acid to be tested.

PRESERVATION OF PEROXIDE OF HYDROGEN.

By addition of 2 per cent. of alcohol or ether, solutions of peroxide can be kept for several months. The Société Industrielle de Mulhouse has given a bronze medal to the inventor of this idea.

A bronze medal was also given by the Société Industrielle de Mulhouse for the discovery that naphthaline preserved the strength of solutions of peroxide of hydrogen. The inventor found that with one grain of naphthaline a solution retained its strength almost indefinitely, even at a temperature of 40° Centigrade.

Calcined magnesia will prevent a too rapid decomposition of the peroxide of hydrogen, according to authority.

BLEACHING WOOL WITH PEROXIDE OF SODIUM.

Put into a wooden tank supplied with lead-pipe connection, water enough to cover the wool to be bleached; add 3 per cent. of oil of vitriol, and add peroxide of sodium slowly and with constant stirring, until the liquor is reduced to exact neutrality. It must be remembered that heat will cause a loss of oxygen and must be avoided. Now introduce the wool and make the solution slightly alkaline with some ammonia. Turn on steam and keep bath for one and one-half to two hours at about 140° F. Draw off, wash first with water containing $\frac{1}{4}$ per cent. of oil of vitriol, wash again with water, and dry.

Peroxide of Sodium would appear to be specially adapted to the bleaching of wool fabrics, silks, linen, etc., which suffer more or less by the treatment with sulphurous acid or chloride of lime. But above all it seems to be the best bleach yet employed for mixed cotton, wool, or silk goods in which the animal fiber is positively damaged by contact

with the chloride or the vegetable fiber by treatment with sulphurous acid.

THE WEIGHTING OF SILK.

The weighting of silk has been carried to a degree which would seem as if it would affect the conscience of the most hardened. It is known that tin chloride produces, with tannic acids, particularly catechu and the fibroin of the silk, an insoluble compound. The amount of the foreign matter taken up can be increased, if the silk is previously treated with iron sulphate and ferrocyanide of potash. To be sure, silks treated in this way are only adapted for the dyeing of black, but for the other colors "pink salts," $\text{SnCl}_4 \cdot 2\text{NH}_4\text{Cl}$, can be used. Furthermore, sodium phosphate, followed by water-glass, is applied, and in this way the fiber is enlarged as well as increased in weight. It is not possible to estimate the adulteration either by the touch, or eye, or taste; chemical means are the only methods. Percentage of silk is obtained by making a determination with nitrogen, using the Kjeldahl method. Normal silk boiled, and then dried at the ordinary temperature, holds 18 per cent. of nitrogen. Artificial silk can further be proved by its lack of the characteristic odor of silk when it burns.

DRYING-ROOM DEVICES.

The man in charge of the can-room of a bleachery frequently notices the trouble that the boys have at the dry end of a set of cans, when, under certain circumstances, the dried cloth is being plaited down; it seems that something like an electrical condition of the goods is developed, and the goods wind round the two rollers used in the plaiting.

This trouble can be entirely obviated by a simple device, which should be brought to the attention of the managers of the bleacheries. It consists in a board about four inches wide, held immediately under the roller around which the cloth was apt to wind itself.

Another idea we noted was a device placed at the end of the cans where more than one width of the goods is run at the same time. It was a slight rail-attachment, similar to a fence, going very nearly as high as the plaiting rollers, and preventing the two bundles of dried cloth from running into one another.

ANTIBENZINPYRIN.

Spontaneous combustion frequently occurs in silk works when the silk is worked in benzin. It may be prevented by the addition of antibenzinpyrin, which is the subject of German patent No. 83,048, covering the addition of certain fatty acids to the benzin bath. A 1-10 or 1-100 of 1 per cent. of oleate of magnesia is said to prevent electric sparks. Other fatty acids effect the same result.

EMBOSSING WITH ALUMINIUM.

Extremely pretty effects are obtained in a certain works abroad, by embossing cloth, and then where the cloth has been raised by the embossing to print powdered aluminum. The aluminum is used in an ammoniacal solution of caseine, and to it may be added shellac in borax solution.

ANILINE BLACK.

This black still remains the finest and best black that can be produced by the dyers' art. Properly dyed, it gives the cotton a soft feel and does not rub off. Sansone, in his "Dyeing and Calico Printing," speaks of a one-dip aniline black: "The only difficulty of this otherwise very useful black is the rubbing, for it rubs very badly." He gives tests for aniline black; one being a test with soda and soap along with a swatch of white cotton; the second being a treatment with 10 per cent. sulphuric acid; the third, sulphuric acid; fourth, stannous chlorid and muriatic acid. There are two disadvantages in the production of aniline black; one is the liability of the color to turn green, and the other is the tendency of a tendering of the fiber. The oxidation cannot be stopped at the exact second when the color is developed, and as a consequence the oxidation attacks the fiber. Professor Noelting, in conjunction with Dr. Lehne, published a book on aniline black, in substance reprints of articles by these gentlemen. Another book has recently been published by Dr. Riehmeier. Among the substitutes proposed are bottoming with Matheson's diamine black, and subsequently topping with weak aniline black. The Farben-Fabriken are recom-

mending aniline chloride as an aniline salt, which does not attack the fiber so much.

The firm of William J. Matheson & Co. bring forward a method of continuous dyeing, Diaminogene B on mercerized cotton goods to replace aniline black. The essential advantages claimed are equality in rank with aniline black as regards shade, fullness, and absolute immunity from tender goods; cost not greater than oxidized aniline black. This method of continuous dyeing is essential in the adoption of machine dyeing. The large feeding tank containing the dye-stuff solution is placed on a level higher than the dyeing-vats. After the dyeing has been completed the goods are washed and then diazotized. Three vats are arranged at such a level that the liquors can be drawn from them. One vat is to contain nitrite of soda and the other muriatic acid; these two articles are run into the first box of the dyeing machine, and the diazotizing is done there. The next box in the machine is to be used for rinsing, and this is done by the use of acidulated water. From the third vat the liquor known as the developing liquor is fed into the third tank. Phenylene diamine, previously dissolved in soda ash, can be used as a developer, also phenylene diamine and resorcin, which combination is usually employed to obtain a shade nearer aniline black. Phenylene diamine and beta-naphthol can be used for blue-black shades.

MERCERIZING.

With the furore over mercerizing cotton into silk, it has now been tried on wool. There has been a good deal of nonsense about the raising of cotton to the grade and rank of silk, because, in the first place, you must have a very good staple, and, after all the labor is put out, is really the gain so very material?

Figures are now to hand showing that while caustic of a specific gravity up to 20° Beaumé reduces the tensile strength very materially, on the other hand, from 20° Beaumé upward, to 36° Beaumé, the strength is less altered, and from 36° on to 50°, a positive increase in tensile strength is secured. What temperature is used in such tests would be very relevant matter, and what contraction is superinduced would be pertinent.

Before passing an opinion on the value of goods said to

be mercerized, it is very advisable to test by washing and drying. Some of the best-looking "mercerized" cloth will lose every particle of its beautiful finish on washing. A pseudo-mercerizing is on the market.

A second application of mercerizing is the very attractive relief effect which can be obtained by printing on to the calico a reserve and then passing the cloth through caustic soda.

A test for mercerized cloth is given in the "Journal of the Society of Chemical Industry," of 1898, on page 43: "Mercerized cotton gives blue color with iodine solution and sulphuric acid." "When mercerized cotton is treated with ammoniacal copper oxide solution, a slight swelling takes place, the central canal usually widens, and the cell wall shows longitudinal striations; but the fiber does not become swollen and constricted in the manner of ordinary cotton, nor are portions of the cuticle dissolved away."

CHROME LACTIC-ACID MORDANT.

The first usage of chrome dates from about 1819, when chromate of lead was used for yellow. In 1832, Camille Koechlin used chrome for the first time as a mordant. Since that time chrome has become an indispensable factor to the dyer and the calico printer. Camille Koechlin, sixty years ago, said, "Chrome has become for our industries the metal of coloration in exactly the same way as iron became for the world the metal of civilization."

The use of bichromate of soda is daily increasing in the practical field, and the more expensive bichromate of potash is being crowded out.

Whether or not lactic acid is better than cream of tartar or sulphuric acid depends considerably on the dye which is to be used. Dyes which alter with chromic acid, such as gallein, alizarine blue, and coeruleine, work well if sulphuric acid is employed in conjunction with lactic.

Good results have been obtained with the following recipe:

Two per cent. of bichromate of potash and soda.

Three per cent. of lactic acid of fifty per cent.

One per cent. of sulphuric acid.

Enter goods at 70° Centigrade, work for half an hour, then boil for an hour.

A good way is to mordant first in bichromate and sulphuric acid and then, after the lapse of half an hour, to add lactic acid.

Chrome has always been considered the mordant for wool and not for cotton. It is now proposed to pass cotton through a solution of bichromate of either potash or soda, and then to develop the hydrate of chrome by applying sulphurous acid. In the presence of excess of ammonia, bisulphite will not react, but so soon as the ammonia is driven off by heating, then the precipitation of the hydroxide of chrome occurs. It is suggested that 50 grams of potassium bichromate be used with 260 grams of bisulphite solution of 56° Twaddle and 100 grams of ammonia. This is raised to a liter, the cotton placed in it for awhile, then dried, steamed, and washed. Considerable chrome is in this way precipitated on the fiber, and alizarine dyes can be used upon the mordant.

E. Knecht suggests that neutral ammonium sulphate should be used to fix chrome oxide on the fibre. In the cold this does not react upon the chromate, but upon steaming it is reduced to chrome oxide.

LACTIC ACID.

Patent No. 584,707 covers a method for the manufacture of lactic acid, consisting of boiling under pressure with the milk of lime at a temperature of 130° C., when the carbohydrates, such as sugars, syrups, starch, etc., are altered by hydrolysis, and the calcium lactate is formed. The usual method to make lactic acid is by fermentation.

THE AMEND PROCESS.

The fastest wool colors are produced on chrome mordanted wool, but most all the modes of proceeding agree in one point, namely, that the mordant has to be boiled.

It was a new departure when O. P. Amend suggested mordanting below the boiling-point. The saving of steam will appeal as first advantage of this process to everyone, but by looking more thoroughly other merits will be discovered which will surpass the economy of saving steam.

The boiling chrome liquor attacks the wool. Sometimes the loss in weight of the wool fiber is considerable. It has to be borne in mind that this loss means more than a mere

mechanical reduction, but it also depreciates the value of the material. The Amend chrome mordant avoids this, not only saves in weight, but renders the mordanted material of higher quality.

In boiling chrome-mordanted wool the chrome is fixed upon fiber which has been attacked by the chrome liquor. The chrome may be combined with the wool substance and oxidation products. But, according to Amend's mordanting process, chromic acid is taken up by the wool fiber without oxidation. No oxidation products being present, the chrome must be in combination with the wool fiber in the natural state. After the reduction of the chromic acid, Amend's mordant represents a combination of wool fiber and chrome oxide only.

The following is the process: For each hundred pounds of woollen material take six pounds of acetic acid (commercial, 30 per cent.), enter at 140° F. and give thirty minutes. Add one pound of chromic acid in water, let stand thirty minutes, and add to the same bath six pounds of bisulphite of soda and give thirty minutes at 140° F. No wash after this bath is necessary if goods can drain off well.

The chromic acid which is taken up by the wool fiber is reduced to chrome oxide by means of the bisulphite of soda. The appearance of the mordant differs from the usual boiling mordant in not being yellow.

Many of the alizarine colors have been recommended to be used in the presence of ammonia in the dye bath, partly for the reason to make them take somewhat better on the fiber. Ammonia with the Amend mordant works well. There is no chance of any chromic acid being taken off the fiber and the presence of ammonia does not prevent the coloring matter from combining with the mordant.

With the Amend mordant only $\frac{1}{2}$ per cent. of ammonia is used in the dye bath with the coloring matter, and no salts are required. This is another step toward turning out the dyed material in good condition. We commend the Amend mordant to the kind attention it deserves.

MORDANTING AND DYEING WOOL IN ONE BATH.

It has been suggested that the mordanting of wool can be done by using 2 per cent. of bichromate of potash or soda, 3.5 per cent. of lactic acid 70 per cent., and 1 per cent. of sulphuric acid, calculating on the weight of the wool; the wool is to be boiled with bichromate and lactic acid until no more chromic acid can be found, except on the fiber. The dyeing can immediately follow, and thus the mordanting and dyeing is done in one bath. For example, a deep blue can be obtained as follows: Mordant one hour and a half by boiling with bichromate, lactic acid, and sulphuric acid in the proportions given above, allow to cool by adding water to 80° Centigrade. Then add 8 per cent. say of Gallein A, paste, and about 12 per cent. of logwood; boil one hour and a half.

CARBONIZING.

The underlying principle is old and well-known, but there have been modifications recently introduced which, in certain specific instances, may be of great value. The prevalent method is to use mineral acids, such as muriatic or sulphuric, or both. Ordinarily, 2 per cent. sulphuric acid is used and the temperature employed is between 70° Centigrade (158° F.) and 72° Centigrade (161.5° F.). The following table is given to show the limits:

Temperature of the hot-room.	Amount of acid used for a two-hours' stay in the hot-room.	Amount of acid used for a half-hour's stay in the hot-room.
80° C. (177° F.)	1½	3 to 7
110° C. (230° F.)	1 to 3	½ to 4½
150° C. (302° F.)	½ to 1	1 to ½

While the stronger acids have a tendency to yellow the goods, this is not any special disadvantage where the goods are to be dyed. The best authorities counsel a bath of soda, followed by washing. It is suggested, in lieu of the mineral acids, muriatic and sulphuric, that aluminum chloride of 6° to 7° Beaumé be used, the goods allowed to lie some hours, then dry at 50° C. (122° F.), and later 145° C. (293° F.). Magnesium chloride, of a strength of 5° to 6° Beaumé, has been proposed.

PART VII.—STANDARD AND NEW METHODS.

TESTING OF HEMATINE.

The Industrielle Société of Mulhouse is examining a method for testing hematine. The apparatus depends upon optical methods, and uses an instrument somewhat similar to a polariscope. A ray of light traverses the liquid, and by a micrometer screw the depth of color can be adjusted to a standard, and the reading gives the value of the hematine.

LOGWOOD TESTING.

A type should be adopted by mills, whether it be simple logwood chip or logwood extract. The testing of colors should be done in at least three different strengths. It very often happens that a difference not evident on a medium dyeing becomes very glaring on a weak dyeing.

One test on extracts is absolute alcohol. Wash the residue with water, then use the microscope. Chestnut extract and tannins are difficult to isolate in the laboratory, and the dyeing tests frequently come so close together that it takes a long series of systematic experiments to form a final opinion.

A test for chestnut extract is the following: Add tartar emetic, and if there is no precipitate the logwood was free from chestnut extract. Chestnut extract will deposit a gelatinous substance.

As a test for tannin the following has been recommended: Acid bismuth nitrate, with pure logwood extract, will give a cloudiness which redissolves in the excess of the re-agent. Whereas, if any tannin were present, the cloudiness will not disappear, but will precipitate to a marked degree.

Albumen precipitates tannin; acetate of iron can also be

used to precipitate tannin, as well as certain pectic matters and the hematine.

Albert Scheurer proposes a method for the estimation of hematine. The process depends on the fact that aluminum hydrate precipitates completely all the hematine. First, solutions are made of alum and of ammonium carbonate, each to contain 20 grams per liter. Forty cubic centimeters of each of these two solutions are mixed, and after a short boil filtered through a tared filter. This is the blank experiment; simultaneously an identical experiment is made, but 10 cubic centimeters of the logwood extract solution, containing 10 grams per liter, are added. The difference between the blank experiment and the experiment made with logwood gives directly the weight of hematine in 0.1 gram of logwood extract.

At the April meeting of the Société Industrielle de Mulhouse, a method for the analysis of logwood is given, consisting of three dyeings—one upon chrome wool to decide on the hematine; the second, using oxidizing mordants to demonstrate the amount of hematoxylin; and the third a dyeing on unmordanted cotton to show the degree of oxidation and the tannins.

SUMACS, ADULTERATION OF AND METHODS FOR THEIR DETECTION.

The *Journal of the Society of Chemical Industry* has an abstract of an article on the determination of sumac, which is of value to dyers and colorists. Sumac can be adulterated by the leaves of other plants, and this can be detected by a nitrogen determination, an ash determination, or an analysis of the ash. Typical analyses are given, showing the variations between the different methods. Other methods are suggested. One of them is to warm with excess of potash and add a few drops of ammonia molybdate; different colors are obtained, and practice enables the analyst to decide whether there has been adulteration or not. Another method is as follows: A solution of 0.15 gr. of safranine in 1 l. of water serves as the standard of comparison. Five gr. of material are boiled for half an hour with $\frac{1}{2}$ l. of water, the liquid cooled, made up to $\frac{1}{2}$ l., and filtered. To 25 c.c. of the filtrate in a beaker 5 gr.

of a solution of basic lead acetate (specific gravity at $15^{\circ} = 1.184$) and 15 c.c. of caustic potash (specific gravity at $15^{\circ} = 1.155$) are added, and the whole concentrated to 15 c.c. The solution should now be reddish-brown and almost clear. If a noticeable precipitate has formed, or if the liquid is only yellow, the sumac is adulterated. The 15 c.c. are diluted to 250 c.c., and, if necessary, filtered; a solution prepared from pure sumac will not show the tint of the safranine solution.

TESTING OF SUMAC.

ADAPTED TO COLORISTS.

Certain solutions must be prepared, and one of these is the solution of pure tannic acid made to contain one-tenth per cent. tannin; also a solution of indigo extract, about 3 per cent. of indigo paste in water.

First, it is necessary to ascertain the relative value of these two solutions; in order to do this, 20 c.c. of the indigo are put into a white porcelain dish with about one liter of distilled water with a few drops of sulphuric acid; then the permanganate of potash solution is run into this indigo extract solution until the liquid turns pale yellow. This operation is now repeated with 10 or 20 c.c. of the pure tannic acid as prepared above; upon deducting the c.c. obtained in the first experiment from the c.c. obtained in the second, the quantity necessary for the oxidation of the 20 c.c. of the solution of tannic acid is obtained.

The relation of the permanganate to the indigo solution should be such that about an equal number of c.c. of each is required, that is to say, the process works to its best advantage when about 20 c.c. of indigo extract require 20 c.c. of permanganate, and when 10 c.c. of the permanganate of potash requires 10 c.c. of the tannic acid as above described.

About five grams of the sumac extract under examination is weighed out, dissolved in pure water, and raised to one liter. Then 20 c.c. of the indigo extract solution is poured into the white porcelain dish along with a few drops of strong sulphuric acid, with 30 c.c. of the solution of sumac extract, and the whole is raised to one liter. Then the permanganate of potash solution is run in from a burette until decolorization

is effected. For example, 10 c.c. of the solution of permanganate of potash corresponds to 20 milligrams of pure tannic acid; 20 c.c. of the indigo solution are decolorized by 20 c.c. of permanganate of potash solution. Five grams of sumac extract have been dissolved, as it has been said, in one liter of water; 30 c.c. of this solution with 20 c.c. of indigo has required, we will say, 40 c.c. of permanganate of potash to decolorize it; therefore, as 20 c.c. of indigo solution are decolorized by 20 c.c. of permanganate of potash, the remaining 20 c.c. (40 less 20) of the decolorizing solution has been necessary for the oxidation of the tannic acid in the sumac extract.

THE ESTIMATION OF TANNIC ACID.

ADAPTED FROM THE UNITED STATES METHOD.

First the hide powder is tested, and this is done by shaking 10 gm. with about 200 c.c. of water for five minutes. This is filtered through muslin, squeezed out by hand pressure, and then the operation is repeated twice more with the same quantity of water; the last filtrate is passed through paper until a perfectly clear liquid is obtained, when 100 c.c. of the final filtrate is evaporated in a weighted dish; this is dried in a water-jacketed oven until the weight is constant. If the residue should amount to more than $1/10$ of 1 per cent., the sample of hide powder should be rejected. Another method of testing the hide powder is to use gallotannic acid, and the hide powder must absorb 95 per cent. of the total solids.

After this preliminary testing of the hide powder the sample under examination is tested for moisture. This is done by using three grams, if it be an extract, and two grams if it is a bark. A flat-bottom dish is used, not less than three inches in diameter.

The second determination is on total solids. If the substance under examination is bark or similar matter, use such an amount of material as to give about 1 gm. of total solids per 100 c.c. of solution, extracting in a soxhlet apparatus; if the substance under examination is an extract, use 20 gm., and dissolve this in 900 c.c. of water at 80° Centigrade, allow it to stand for twelve hours, and then raise to 1,000 c.c. We

are now ready to proceed with the determination of the total solids. This is done by shaking well, and then taking about 100 c.c. in a pipette, using care that the solution should be at 20° Centigrade. Now evaporate in a weighed dish, and dry to constant weight in a water-jacketed oven.

The next step in the analysis is to proceed for the estimation of soluble solids. To do this, 125 c.c. of the solution at 20° Centigrade is filtered through a double-folded filter, returning the filtrate through the filter once. Then evaporate 100 c.c. to constant weight and weigh.

Then comes the determination of tannin substances, and this is done in the following way: Prepare 20 gm. of hide powder by shaking for five minutes with 250 c.c. of water and straining through linen. Repeat the operation three times. Finally, remove as much water as possible by squeezing in a press. Transfer the pressed hide powder to a covered dish, and weigh. Dry a portion approximately equal to one-fourth of the whole to constant weight at 100°. Add the remainder of the hide powder to 200 c.c. of the original unfiltered solution and shake for ten minutes. Squeeze through linen, collect the filtrate, add 5 gm. of kaolin free from soluble salts, stir well, and filter, returning the first 25 c.c. Evaporate 100 c.c. as before. The weight of the residue must be corrected for the dilution caused by the water contained in the hide powder. The difference between the soluble solids and the last residue obtained is the amount of tanning material absorbed by the hide powder.

TESTING THE NON-TANNIN FILTRATE.

(a) For Tannin.—Test a small portion of the clear non-tannin filtrate with a few drops of a one per cent. solution of gelatin. A cloudiness indicates the presence of tannin, in which case the determination must be repeated, using 25 gm. of hide powder instead of 20 gm.

(b) For Soluble Hide.—To a small portion of the clear non-tannin filtrate add a few drops of the original solution, previously filtered to remove reds. A cloudiness indicates the presence of soluble hide, due to incomplete washing of the hide powder. In this case, repeat the determination with perfectly washed hide powder.

STRENGTH OF REAGENTS.

Potassium Carbonate. K_2CO_3 .—Solution in five parts of water.

Sodium Carbonate. Na_2CO_3 .—A solution of one part of the crystallized salt ($Na_2CO_3 \cdot 10H_2O$) in five parts of water.

Ammonium Carbonate. $(NH_4)_2CO_3$.—One part of the crystallized acid carbonate $(NH_4)_4H_2(CO_3)_3$, in four parts of water, with addition of one part of ammonium hydrate.

Ammonium Sulphide. Normal, $(NH_4)_2S$.—Super-sulphide, $(NH_4)_2S_2$. Acid sulphide, NH_4HS .

Sodium Phosphate. Na_2HPO_4 .—One part of the crystallized salt, $Na_2HPO_4 \cdot 12H_2O$, in ten parts of water.

Ammonium Oxalate. $(NH_4)_2C_2O_4$.—One part of the crystallized salt, $(NH_4)_2C_2O_4 \cdot H_2O$, with 24 parts of water.

Potassium Bichromate. $K_2Cr_2O_7$ or K_2CrO_4 , CrO_3 .—Solution in ten parts of water.

Potassium Bromide. KBr .—One part dissolved in fifteen parts of water.

Potassium Iodide. KI .—Solution in 20 parts of water.

Potassium Ferrocyanide. K_4FeCy_6 .—The crystallized salt ($K_4FeCy_6 \cdot 3H_2O$) dissolved in 12 parts of water.

Potassium Ferricyanide. $K_3Fe_2Cy_{12}$.—Solution in 12 parts of water.

Potassium Sulphocyanide. $KCyS$.—Solution in 12 parts of water.

Ammonium Chloride. NH_4Cl .—Solution in 8 parts of water.

Magnesium Sulphate. $MgSO_4$.—Solution of the crystallized salt ($MgSO_4 \cdot 7H_2O$) in 10 parts of water.

Calcium Chloride. $CaCl_2$.—Solution of the crystals ($CaCl_2 \cdot 6H_2O$) in eight parts of water.

Calcium Sulphate. $CaSO_4$.—Saturated solution, containing one part of the salt to about 400 of water.

Barium Chloride. $BaCl_2$.—Solution of the crystallized salt ($BaCl_2 \cdot 2H_2O$) in 10 parts of water.

Ferrous Sulphate. $FeSO_4$.—Solution of the crystallized salt, $FeSO_4 \cdot 7H_2O$, in 10 parts of water.

Ferric Chloride. Fe_2Cl_6 .—One part of the solid salt, $Fe_2Cl_6 \cdot 6H_2O$, to 15 parts of water.

Copper Sulphate. $CuSO_4 \cdot 5H_2O$.—To 8 parts of water.

Lead Acetate. $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$.—One part of $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$ dissolved in 10 parts of water.

Silver Nitrate. AgNO_3 .—Solution in 20 parts of water.

Mercuric Chloride. HgCl_2 .—One part in 16 parts of water.

Mercurous Nitrate. $\text{Hg}_2(\text{NO}_3)_2$.—One part dissolved in 20 parts of water acidulated with one part of nitric acid.

A SHORT SYSTEM OF ANALYSIS ADAPTED TO COLORISTS AND CHEMISTS.

PRELIMINARY TESTS ON LIQUIDS.

Litmus, curcuma, KI and Pb papers. Try one portion with H_2SO_4 dil., and note the gas evolved; also HCl , dil.; and to this latter add BaCl_2 for sulphates. In presence of Ag, Pb and Hg_2 use BaNO_3 . Try another portion with AgNO_3 and HNO_3 for chlorides. Corroborate presence of chlorides by PbA, giving white precipitate soluble in hot H_2O . Iodides will give a yellow. Further, chlorides heated with a mix of $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 evolve fumes of $\text{Cr}_2\text{Cl}_2\text{O}_2$. Traces of free HCl can be detected by heating with MnO_2 and passing evolved Cl through KI and starch solution. $2\text{KI} + 2\text{Cl} = 2\text{KCl} + \text{I}_2$. FeSO_4 concentrated solution, with H_2SO_4 conc. for nitrates; indigo solution also. Magnesia mixture or molybdic solution with HNO_3 for phosphates. CaCl_2 solution gives white precipitate insoluble in CH_3COOH with oxalates; a white precipitate soluble in KOH with tartaric acid; and a white precipitate soluble in HCl with H_2SO_3 or H_2SO_4 .

Evaporate a portion to dryness, and follow the preliminary tests for solids.

PRELIMINARY TESTS ON SOLIDS.

Flame Reactions. Beads of PhS . and $\text{Na}_2\text{B}_4\text{O}_7$.—Heat in a straight and open tube, held obliquely for S; then heat in a bulb-tube, first alone and then with KHSO_4 , and afterward with HCl dil.; and then with H_2SO_4 conc. Heat on C alone, and then with NaHCO_3 , using Ag coin for S; heat also on C. with KNO_3 , KCy , Bi flux. Try solubility in H_2O , HCl dil.; HNO_3 ; H_2SO_4 . Or fuse with K_2CO_3 and then dissolve.

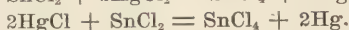
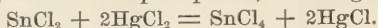
Silver Group.—Add HCl dil. Filter and wash precipitate, which may be AgCl , PbCl_2 or Hg_2Cl_2 ; wash twice with cold

H₂O and once with hot; save only hot washings; to hot washings add H₂SO₄; white precipitate shows Pb; confirm by K₂CrO₄. To precipitate left on filter add AmOH; if it turns black it shows Hg. Filter and add HNO₃.

Copper Group and Arsenic Group.—Warm the solution and add H₂S; precipitate may be PbS, HgS, Bi₂S₃, CdS, CuS, and As₂S₃, Sb₂S₃, Sb₂S₅, SnS, and SnS₂. Wash the precipitate, and digest with yellow Am₂S, using K₂S in presence of CuS. Note: Am₂S is colorless, and Am₂Sx is yellow; saturate three parts of AmOH with H₂S to make AmSH, and then add two parts AmOH to make Am₂S. Filter off the sub-group and boil off the H₂S.

Copper Group.—Boil with HNO₃ and filter; black residue shows Hg. To filtrate, add H₂SO₄, dil., and a white precipitate shows Pb. Filter and add AmOH, when a white precipitate proves Bi(OH)₃ and a blue indicates Cu; filter and add H₂S, and a yellow shows Cd, and a brown precipitate Cu. If brown, solve in KCN and add H₂S, and a yellow precipitates proves Cd.

Arsenic Group.—The preliminary tests are: Heat on C with six times its weight Na₂CO₃ mixed with KCN for the As odor; Sb is volatile and Sn gives a non-volatile coat, going to bluish-green with CoN₂O₆. Sn in Na₂B₄O₇ with CuO gives a red glass bead. After the H₂S has been boiled off, re-precipitate the sulphides with HCl dil., and then dissolve them in HCl conc. Filter. The residue is As₂S₃, which is taken up by aqua regia, and corroborated by Marsh's test, where it dissolves in NaOCl or Cl water. The liquid holding SbCl₃ and SnCl₄ is evaporated to drive off the major part of the HCl; then add Zn, and in some cases KClO₃ and Pt, when Sb will produce a black stain on the Pt, soluble in HNO₃, dil. For proof of the Sn add HgCl₂ to the solution, which will grow darker and give a white precipitate, showing Sn.



Iron Group.—First perform a preliminary experiment to prove presence or absence of oxalates, phosphates, and chrome.

For Oxalates.—One part of the precipitate formed by Am₂S is boiled with a concentrated solution of Na₂CO₃; the filtrate, while still hot, is acidified by acetic acid, and CaCl₂ is added; CaC₂O₄ shows original oxalates. If oxalates were present, dissolve in HCl, and evaporate to dryness, and heat to redness to change all oxalates to carbonates.

For Phosphates.—Use Am_2MoO_4 dissolved in AmOH , and, when clear, pour on to HNO_3 conc. until a permanent precipitate begins to form. From Valentin, 286. For preliminary phosphate test, use the precipitate formed by Am_2S , dissolving it in HNO_3 dil. but hot, filter, and add the Mo solution.

The preliminary for chrome is made by the PhS bead; also by fusing with KNO_3 and Na_2CO_3 , which forms K_2CrO_4 ; filter, neutralize with acetic acid, add AgNO_3 , and this gives a brownish-red precipitate, AgCrO_4 .

Full Course.—After the elimination of oxalates the precipitate from Am_2S is dissolved in HCl and evaporated several times to dryness with HNO_3 , or else the residue obtained by the transformation of oxalates into carbonates is dissolved in HNO_3 conc. This nitric-acid solution is heated on a water-bath for half an hour with excess of tin. Then take up with H_2O acidified with HNO_3 and filter; the residue is $(\text{PO}_4)_3\text{Sn}_2$ and SnO_2 , and the filtrate holds nitrates of Fe, Al, Cr, Zn, Mn. Warm gently the solution holding the iron group, add AmCl , AmOH , and Am_2S . This gives FeS , $\text{Al}_2(\text{OH})_6$, $\text{Cr}(\text{OH})_3$, ZnS , MnS , NiS , and CoS . Filter, wash with water containing a little Am_2S and finally with water alone. Treat the precipitate with HCl dil. and cold, and then filter; this leaves behind the NiS and CoS . Filtrate is to be boiled with KClO_3 crystals until the odor of Cl persists, then nearly neutralize with Na_2CO_3 or NaOH , and allow to stand until it becomes perfectly cold; then add BaCO_3 and let stand for some time, shaking occasionally; finally filter; the filtrate (a) holds ZnCl_2 and MnCl_2 ; the residue (b) holds $\text{Fe}_2(\text{OH})_6$, $\text{Al}_2(\text{OH})_6$, $\text{Cr}_2(\text{OH})_6$ and the excess of BaCO_3 . Dissolve in H_2SO_4 dil., boil, and filter; if necessary, boil and re-filter; to filtrate, add KOH in excess, boil three minutes, and filter; (aa) precipitate is $\text{Fe}(\text{OH})_3$ and $\text{Cr}(\text{OH})_3$; (bb) filtrate is $\text{Al}(\text{ONa})_3$. Fuse precipitate aa with KNO_3 and Na_2CO_3 , dissolve in H_2O , filter, and add CH_3COOH ; add $\text{Pb}(\text{CH}_3\text{CO}_2)_2$, and a yellow precipitate proves Cr. Its solution in HCl shows Fe by the blue with KC_y ; bb filtrate, with HCl and AmOH giving a white precipitate shows $\text{Al}_2(\text{OH})_6$. Fuse with CoNO_3 for making cobaltous aluminate.

The filtrate (a), holding the Zn and Mn, is treated with KOH in excess and filtered; (i) to the filtrate add H_2S for ZnS ; (ii) precipitate is to be fused with KNO_3 and Na_2CO_3 to

get the green sodic manganate, Na_2MnO_4 . Corroborative test for Mn is the violet borax bead while hot, turning to amethyst on cooling. Reducing flame makes it colorless.

The nickel and cobalt come so rarely into color-work and the discrimination between them is so little called for that it hardly seems worth while to give methods in detail. In a borax bead the Ni gives a brown bead and the Co a blue. Ni with Co will give the blue, and is to be dissolved in aqua regia; evaporate off excess of acid, add KNO_3 , and stand; yellow precipitate shows Co; filter, and to filtrate add KOH, when a green precipitate shows Ni. Valentin, 33.

Alternate.—Dissolve in KClO_3 with HCl, evaporate to dryness, dissolve in H_2O , add KCN in excess, 5 per cent. solution, then a drop of acetic acid, and boil a minute; add NaClO in excess and boil again; black precipitate shows Ni; filter off Ni, and test for Co by evaporating to dryness and using $\text{Na}_2\text{B}_4\text{O}_7$ bead.

The borax bead will only show the blue after long treatment with the R. F., in cases where there is much Fe, Cu, Mn, or Ni.

Barium Group.—Add HCl, boil, and filter to remove S; then make alkaline by AmOH , warm, and add Am_2CO_3 , and filter. Wash precipitate with hot H_2O , dissolve in a little HCl, and add CaSO_4 . Immediate precipitate shows Ba; precipitate after awhile indicates Sr. To another portion of the precipitate dissolved in the HCl, add H_2SO_4 and boil to remove Ba and Sr; filter neut. by AmOH and add ammonium oxalate for Ca. Or evaporate the HCl solution with excess HCl, and warm with absolute alcohol and separate to (a) residue and (b) filtrate. (a) If BaCl_2 , outer flame in burner is made green, the solution in H_2O treated with K_2CrO_4 gives BaCrO_4 . (b) This holds the CaCl_2 and SrCl_2 . Evaporate to dryness with HNO_3 several times, and warm with absolute alcohol and filter. (aa) Residue is SrCl_2 (flame test), and the filtrate (bb) is $\text{Ca}(\text{NO}_3)_2$, which colors the flame yellowish red, and with oxalate ammonium gives CaC_2O_4 .

Am, K, Na, Mg Group.—Treat original liquid with NaOH and heat for Am; AmOH , and Na_2HPO_4 for MgHPO_4 ; also blp. and CoN_2O_6 . Flame tests for Na and K. Special for K is that PtCl_4 gives 2KCl.PtCl_4 , which ignites to Pt and KCl; ammonium gives 2AmClPtCl_4 , which ignites to Pt only. Tartaric acid

with K and Am gives similar precipitates, but the K ignites to alkaline residue.

ARGOL ANALYSIS.

1. METHOD FOR ESTIMATING THE TARTRATES IN AN ARGOL.

Into a 100 c.c. flask put 7.52 gm. of the argol to be tested, and add 30 c.c. HCl (320 gm. of acid to the liter). After shaking thoroughly, let it stand overnight. Then make up to 100.5 or 101 c.c., according to the amount of insoluble matter in the argol. Next heat 25 c.c. of a solution of potassic carbonate (of 328 gm. to the liter), and slowly add to it 50 c.c. of the filtered argol solution. Having boiled this solution five minutes, wash it into a 100 c.c. flask and raise to that volume. Then filter half of the solution and evaporate it to 15 c.c. Add 3 c.c. of glacial acetic acid and from 100 to 150 c.c. of 95 per cent. alcohol, taking about five minutes to add the latter. Allow the mixture to stand half an hour, so that there will be complete formation of crystals, and then decant and wash the crystals on a filter with alcohol till they are free from acetic acid. When the crystals are well drained return them to the dish with the filter-paper and titrate with deci normal solution of sodic hydrate, using phenol phthalein as indicator.

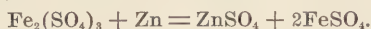
2. METHOD FOR TESTING THE POTASSIC BITARTRATE IN AN ARGOL.

Boil 3.76 gm. of the argol five minutes with 750 c.c. of water, cool solution, and make it up to a liter. Filter 500 c.c. of the solution through a dry filter-paper, evaporate this filtered solution on a water-bath to dryness, and after the residue is dry let it stand on the bath half an hour. Moisten the residue with 5 c.c. of water. When the mixture is cold, add to it 100 c.c. of 95 per cent. alcohol, stir well, and let it stand for half an hour. Put the liquor and crystals on a dry filter-paper, and when the crystals are well drained return them to the dish with the filter-paper and add 100 c.c. of water. Heat the mixture and titrate with deci normal solution of sodic hydrate, using phenol phthalein as an indicator.

ZINC DUST ANALYSIS.

A new method has been proposed, based on the reduction of ferric sulphate, and the amount of ferrous salt formed is determined volumetrically with standard permanganate solution. Of the zinc dust in question, $\frac{1}{2}$ gr. is put into a stoppered 250 c.c. flask, together with 25 cc. of water. Shake until the zinc is well suspended, and then introduce 7 gr. of chemically pure dry ferric sulphate.

After shaking for fifteen minutes, the reduction will be complete; then add 25 c.c. of strong sulphuric acid, fill up with water, mix, and allow to settle. Draw off 20 c.c. of the liquid, add the same volume of water, and titrate with permanganate. The amount of ferrous salt is immediately indicated, and the percentage of metallic zinc may be calculated from the formula:



SOAPS AND SOAP ANALYSIS.

ADAPTED TO THE NEEDS OF COLORISTS.

Caustic soda permits of a fictitious "body," and the soap has a tendency to hold a larger percentage of water without giving itself away so readily.

What the management of a mill desires to know is the moisture, the kind of oil or fat employed, and whether there is any free caustic, free carbonate, starch, insoluble matters, silicate of soda, Glauber's salts, or unsaponified fat in the soap.

To obtain this the analysis proceeds in the following way: 8 to 10 gm. of fine shavings are dried at 60° to 70° Centigrade, and later between 100° to 105° Centigrade to constant weight. Soaps containing free caustic should be dried in carbonic acid, free air, or the water is determined by difference after all the other constituents have been estimated.

The second test is the determination of unsaponifiable and uncombined fat. This is done by taking the soap which was dried in making the moisture determination, and extracting with ether; this extract is then evaporated and weighed, and the percentage of unsaponified fat is thus obtained.

The third determination is for free caustic. The residue from the fat determination is dissolved in alcohol, filtered, and to the filtrate phenolphthalein is added; if the color becomes pink it indicates free caustic alkali, but if there was no change of color there was no free caustic. In the event of the soap turning to pink, decinormal or centinormal acid is run in until the color returns yellow. The reading obtained gives a basis for calculating the amount in percentages.

The fourth determination is for any free carbonate. To make this determination, the insoluble residue from the previous test is used. It is dissolved in warm water and is titrated with decinormal HCl acid, methyl orange being used as an indicator.

Total Alkali.—The total alkali consists of the free caustic and free carbonate and the combined alkali. Thirty grams of soap dissolved in hot water with 50 c.c. of normal sulphuric acid. Filter the whole or an aliquot part of the same. The filtrate is titrated back with caustic soda, methyl orange being preferably used as indicator. The amount of alkali combined with the fatty acids is obtained by subtracting the sum of the free caustic and carbonated alkali from the total.

The fifth determination is for insoluble matter. Any insolubles will remain on the filter from the last test. The filter-paper is dried and the estimation made by simple calculation into per cents. This insoluble residue may consist of water-soluble salts, generally chloride, sulphate, and carbonate of the alkalies, water-glass, borax, etc., or it may consist of water-insoluble mineral substances like chalk, clay, silica; or it may contain organic substances, as starch and glue.

Alkali, carbonated and borated, are determined by extracting with cold water and determining in aliquot portions of carbonate, silicate, and borate of alkali.

Sodium-chloride and sulphate are determined in an aliquot part of water extract by means of silver nitrate and barium chloride. The part insoluble in water is ignited to destroy organic matter, weighed, and then washed and analyzed qualitatively and quantitatively. In the portion insoluble in alcohol, water extracts dextrine, and this can be precipitated from the water solution by alcohol.

The presence of starch in the insoluble residue is discov-

ered by the microscope, and the reaction with iodine solution. The starch can be determined by converting into sugar by means of dilute sulphuric acid, neutralizing the solution with barium carbonate, filtrating, and determining with Fehling's solution. To test the insoluble portion for glue, it is extracted with warm water, the solution gelatinizes on cooling, and gives a precipitate with tannin solution.

The sixth test is the test for combined fatty acids. The alcohol filtrate obtained from the determination made for free caustic is largely diluted with water; enough acid is added to separate the fats. These fats are taken out with ether, weighed, and reported as fatty acid.

Determination of Total Fat.—The fatty acids separated from the soap by the following processes should only be considered as such, when no fat, resin, or unsaponifiable matter is present. In order to determine the amount of fatty acids combined with the alkali, the amount of the foregoing impurities must first be determined and subtracted.

Five to twenty grams of soap dissolved in a small quantity of water, shaken up in a separatory funnel with an excess of diluted sulphuric acid or hydrochloric acid. The separated fatty acids are dissolved with petroleum ether. Petroleum ether solution is then evaporated in a tared flask, and residue weighed. In expressing the results of analysis, the amount of fatty acid has to be calculated to fatty anhydrides.

The question as to whether free fat acids are present may sometimes be settled by Jacobsen's method of adding a little rosaniline to the oil. If free fatty acids are present, the oil turns red in color in consequence of the formation of rosaniline oleate. More important is the adulteration with resin and with hydrocarbon oils. In the absence of free fatty acids, resin may be isolated from fixed oils by agitating the sample with moderately strong alcohol, separating the spirituous solution, and evaporating it to dryness.

The separation of the resin acids from free fatty acids is best effected by a method based upon the ready solubility of silver resinate in ether, and the almost complete insolubility of silver oleate, etc., in the same menstruum, even in the presence of a small quantity of alcohol. The exact separation of the mixed fatty acids is hardly possible. Perhaps the most satisfactory method known is based on the fractional pre-

cipitation of the alcoholic solution of the acids with magnesium acetate. This salt precipitates acids of the stearic series more easily than it does oleic acid and its homologues, and, of the different homologues of the stearic series, those of the highest molecular weights are thrown down first.

The Koettsdorfer number, or the "saponification equivalent," is often a key to the character of the oil or fat. It is determined as follows: About 1.5 to 2.5 gm. of the fat is treated with 25 c.c. of one-half normal alcoholic potash; when saponification has taken place, 1 c.c. of an alcoholic solution of phenolphthalein is added, and the liquid titrated with one-half normal hydrochloric acid. A blank experiment is then made by titrating 25 cubic centimeters of the alcoholic potash alone, and the difference in the volumes of the acid used gives the volume of the potash solution neutralized by the fat, each 1 c.c. corresponding to .02805 gm. of potassium hydrate, whence the saturation equivalent is easily calculated. The saponification test is used in connection with many others for the identification of oils, and is known as the saponification number, or Koettsdorfer value or number.

TESTING FOR ACIDS IN GOODS.

This can sometimes be done by dyeing the goods in alkali blue.

PART VIII.—SUNDRIES.

BUYING ON SPECIFICATION.

THE MODERN METHOD OF PURCHASE.

For a number of years the Pennsylvania Railroad has been purchasing by specification. When this plan was first entered upon there was a great deal of trouble, but to-day the very dealers who were the greatest objectors are now the most desirous of having more specifications drawn.

By a specification is meant a specific, definite, concise, and detailed order. Nearly all law suits come through lack of definition in the contract. One man says one thing and means another. In logic also it is a first rule that proper definition is the prime requisite.

To give some suggestions the following might be cited. Individual cases require modification, but these specifications are fairly representative.

TOILET SOAP.—This must show on analysis:

1. Not more than one-fourth of one per cent. of foreign mineral matter.

2. Not more than one-fourth of one per cent. of carbonated alkali reckoned as carbonate of soda (Na_2CO_3).

3. Not more than one-fourth of one per cent. of uncombined caustic alkali reckoned as caustic soda (NaOH).

4. Nor should the soap leave an odor of cocoa-nut oil, palm oil, or palm-nut oil on the hands.

COMMON SOAP.—This must not show on analysis:

1. More than one-half of one per cent. of foreign mineral matter.

2. More than one-half of one per cent. of carbonated alkali reckoned as carbonate of soda (Na_2CO_3).

3. More than one-fourth of one per cent. of uncombined caustic alkali reckoned as caustic soda (NaOH).

4. Nor must the soap leave an odor of cocoa-nut oil, palm oil, or palm-nut oil, on the hands.

SCOURING SOAP. The material desired under this specification is a soap which must not contain:

1. More than 30 per cent. of water.
2. More than 1 per cent. of free carbonate, unless stipulated.
3. It must have no free caustic soda.
4. It must contain no silicate of soda nor rosin soap, unless stipulated.
5. There must be no foreign mineral matter.

6. It must not contain nitro-benzol or other substances to disguise unpleasant odors. The odors should not be disagreeable when rubbed in the palm of the hand.

FULLING SOAP.—The material desired under this specification should meet the following conditions as near as possible:

1. It must not contain more than one-fourth of one per cent. of foreign mineral matter.

2. It must contain no silicate of soda nor rosin, unless so stipulated.

3. It must have no free caustic soda.

4. It must not contain more than one-fourth of one per cent. uncombined carbonate of soda, unless so stipulated.

5. It must contain no organic matter foreign to a pure soap.

6. It must contain no nitro-benzol or other substances to disguise the odor. The odor should not be in the least disagreeable when rubbed in the palm of the hand.

7. The soap must be made up approximately of 7 per cent. combined alkali, 63 per cent. fatty anhydrides, and the balance water.

PROVISIONAL SPECIFICATION FOR GALIPOLI SOAP FOR A SILK MILL.—The material desired under this specification is soap which must not contain:

1. More than 30 per cent. of water.
2. More than one-tenth of one per cent. free carbonate.
3. More than one-fourth of one per cent. of foreign mineral matter.

4. It must contain no silicate of soda or resin unless otherwise stipulated.

5. It must contain no free caustic soda.

6. It must contain no nitro-benzol or other substance to

disguise the odor. The odor should not be in the least disagreeable when rubbed in the palm of the hand.

7. The soap must be made up from pure olive oil.

CRYSTALLIZED GLAUBER'S SALTS.—Crystallized Glauber's salts or normal crystallized sulphate of soda ($\text{Na}_2\text{SO}_4 \cdot 10 \text{H}_2\text{O}$).

1. Must not contain material amounts of iron.

2. Must not contain more than 56 per cent. water.

CALCINED OR DESICCATED GLAUBER'S SALTS.—The material it must not contain:

1. Material amounts of iron.

2. More than 1 per cent. of water.

3. It must not be acid.

SAL SODA.—The sample should have 21 per cent. alkaline strength, and approximately ten molecules of water.

PROVISIONAL SPECIFICATION FOR CAUSTIC SODA.—The material desired under this specification is sodic hydrate (NaOH), as free as possible from other substances. It may come in drums, or as a powder. It must not contain notable quantities of:

1. Iron.

2. Carbonate.

3. Water.

SPECIFICATION FOR CAUSTIC POTASH.—The material desired under this specification is potassic hydrate (KOH), as free as possible from other substances. It must not contain notable quantities of:

1. Iron.

2. Carbonate.

3. Water.

4. Less than 97 per cent. caustic potash will be returned.

PROVISIONAL SPECIFICATION FOR MURIATIC ACID.—The material desired under this specification is commercial muriatic acid, 20° Beaumé, chemically known as hydrochloric acid, HCl , as free as possible from all other substances.

1. A sample containing any considerable amount of iron will be rejected.

2. Acid of 20° Beaumé at 15° Centigrade should contain 32 per cent. HCl .

3. It must evaporate clean.

SPECIFICATION FOR SODA ASH is to be drawn in accordance

with the alkaline strength. The relation between the values is given herewith:

Na_2O	NaCO_3	English Alkali.	Liverpool and New York Alkali Test.
46.5	.....	47.11	48.00
47.0	80.37	47.62	48.50
49.0	.....	49.64	50.58
51.0	87.19	51.67	52.64
53.0	.....	53.70	54.70
55.0	.....	55.72	56.77
55.5	.....	56.23	57.29
56.0	95.74	56.74	57.80
56.5	.....	57.24	58.32
57.0	97.45	57.75	58.83
57.5	.....	58.26	59.35
58.0	.....	58.76	59.87
58.5	100.02	59.27	60.38

SPECIFICATIONS FOR SAL SODA.—The sample will be considered good which has 21 per cent. alkaline strength, and has approximately ten molecules of water.

BLEACHING POWDER.—The strength of the article in available chlorine will serve as a basis upon which bills will be paid. Prices should be quoted on 35 per cent. chlorometric strength, and for each per cent. over or under 35 per cent. chlorometric strength $1/35$ should be added or subtracted.

NITRITE OF SODA.—The specification calls for sodic nitrite (NaNO_2), as free as possible from all other substances.

The sample should test above 97 per cent. of sodium nitrite.

BLUE VITRIOL.—The material desired is normal crystallized sulphate of copper, as free as possible from other substances.

1. It must not contain more than $1/4$ of 1 per cent. crystallized sulphate of iron.

1. It must not contain more than $1/2$ of 1 per cent. of impurities.

SAL AMMONIAC.—The material called for by this specification is granulated chloride of ammonium (NH_4Cl), as free as possible from any other substances.

1. It must not contain less than 65.15 per cent. of chlorine.

2. It must not contain less than 31.2 per cent. of ammonia (NH_3).

COCOANUT OIL.—Cocoanut oil is desired as free as possible from all other substances.

1. The iodine number should be between 8 and 9.
2. The saponification number should be above 265.
3. The specific gravity at 99° Centigrade, taking water at 15.5° Centigrade, should be above 0.87.
4. It should be soluble in two parts of 90 per cent. alcohol at 60° Centigrade.

WHEAT-STARCH.—The material desired under this specification is wheat-starch, free as possible from all other substances.

1. It must not contain notable per cents. of ash.
2. It must not contain more than 15 per cent. of water.
3. Under the microscope it must show the characteristic granules of wheat-starch as given in photographs of wheat granules in standard works.

CORN-STARCH.—The material desired under this specification is corn-starch, free as possible from all other substances.

1. It must not contain notable per cents. of ash.
2. It must not contain more than 15 per cent. of water.
3. Under the microscope it must show the characteristic granules of corn-starch as given in photographs of corn-starch in standard works.

TEXTILE PRIZES.

The Industrial Society of Mulhouse, Alsace, Germany, has issued the programme of prizes which are to be competed for in 1899. This society annually offers prizes, medals, and honors. A partial list is given herewith.

A medal of honor will be given for a synthesis of the coloring principle found in cochineal; for a study on cochineal carmine; for a red which can be used on tannin mordant, which will be as bright as alizarine red and fast to soap.

A prize is offered for a way to account for the differences in aniline blacks.

A prize is offered for a work of scientific value concerning the transformation of cotton into oxy-cellulose. A paper of merit upon the synthesis of one of the many natural coloring-matters used in the dyeing industry will be honored. A silver medal is offered for a coloring-matter which can replace logwood in its different applications, having the advantages of

logwood in point of stability and fastness. A meritorious study in iron mordants and the rôle which these mordants play in dyeing will receive a medal.

A medal will be given for a blue similar to ultramarine blue in fastness and shade, which blue must be applicable to cotton without the aid of albumen or other thickening agent. There is a silver medal for a yellow which can be fixed in the same method as alizarine and will possess the solidity equivalent to alizarine yellow. A medal is offered for a reserve for steam colors particularly adapted to wool and removable by a simple washing in water in the same. A silver medal is offered for a powder which can be printed on the cloth and give the same effect as gold or silver. This powder must resist washing.

A medal of honor, either silver or bronze, according to the merit of the work, will be given for the best practical manual upon the bleaching of cotton, wool, wool with cotton, silk, flax, linen, and other textiles.

A medal is offered for a research upon the preparations and applications of hydrogen peroxide as a bleaching agent of textile fibers.

A silver medal will be given for a marking compound suitable for cotton to be dyed in reds or deep colors. There is a silver medal offered for a practical process which will remove stains from cloth. This new process must be applicable and at a price which will not increase the cost of the goods materially. The removal of oil-stains by hand is not a permissible solution of the problem.

A silver medal is offered for a thesis explaining the cause which makes different kinds of cotton bleach defectively.

DYEING WHITE.

There are two patents recorded by Mr. Carter. One of them speaks about the state of art, phrasing the matter as follows:

"Prior to my invention it has been the custom, in the art of calico printing particularly, to imprint upon the fabric the designs with a pigment consisting of oxide of zinc or sulphate of barium, to which albumen has been added, and to subsequently subject the fabric to the effect of heat, so as to de-

compose the albumen, whereby the latter will mechanically bind the pigment upon the fabric. It has also been proposed to print upon the fabric, where a white effect is desired, with tungstate of soda to which gum or starch is added, and subsequently passing the fabric through a solution of barium chloride, whereby insoluble tungstate of barium will be produced as the coloring-matter. This color, however, has been more or less fugitive, and it is the object of my invention to increase its permanence."

This invention consists in subjecting tungstate of soda in such a way that it remains permanent on the fiber. The inventor has discovered that a sulfocarbonate of cellulose, when applied to a fabric and subjected to heat so as to be decomposed, possesses the property of adhering with such tenacity to the fabric as to be practically incapable of removal, and he bases his invention upon this discovery. He adds to a sulfocarbonate of cellulose a suitable white pigment, preferably tungstate of barium, and when the former is subjected to heat it be fixed with almost absolute permanence upon the fabric. The sulfocarbonate of cellulose which is used in carrying out the improved process is known in the market as "viscose."

FREEZING MIXTURES.

Substances to be mixed in parts by weight:

1.—Water	1
Ammonium nitrate	1
2.—Snow	1
Sodium chloride	1
3.—Snow	1
Calcium chloride	1.3
4.—Snow	1
Sodium chloride	0.4
Ammon. chloride	0.2
5.—Snow	1
Sodium chloride	0.416
Ammon. nitrate	0.416

BRIGHTER COLORS.

It is said that colors can be brightened by using a decoction of soap root (*Quillaya Saponaria*) in the dye-baths in conjunction with the colors dyeing in neutral baths.

TUNGSTEN AND MOLYBDENUM AS MORDANTS.

A recent number of the *Revue Générale des Matières Colorantes* has an article on the Mordants of Tungsten and Molybdenum by Edward Knecht. It is only worth the while to give the conclusions, namely, that these mordants do not fix the colors upon the fiber with the same satisfaction which can be obtained by using the mordants from chrome.

CEMENTING CLOTH TO IRON.

A good cement for fastening cloth to iron is said to be made from linseed oil, rendered dry by boiling with litharge mixed with well-dried pipeclay; then thin with oil of turpentine.

AN ADHESIVE CEMENT.

Equal proportions of gum tragacanth and tapioca ground together and heated with water at about 70° F., after which there are added about 50 per cent. of gum and an equal amount of starch, and the whole mixture heated at from 70° to 120° F. The cement thus produced is said to be superior to any hitherto known.

FULLERS' EARTH.

The best is found in Buckinghamshire and Surrey, England. When good it is of greenish-white or greenish-gray color, falls into powder in water, appears to melt on the tongue like butter, deposits very little sand when mixed with boiling water, and is soft and greasy to the feel.

DRYING OF LAKES.

There has been brought before the Committee of Chemistry of the Société Industrielle de Mulhouse a new process for the treating of lakes. The process consists of precipitating upon a thin sheet of metal the lake to be treated. This thin sheet of metal passes over into a current of warm air, where the precipitate is dried. The process has been invented by M. Alph. de Huillard of Suresnes.

SHRINKAGE IN FLANNELS.

According to a French patent, shrinkage of flannels can be avoided by passing the goods through a strong solution of borax mixed with albumen, followed by a dilute acid with or without an addition of alum.

HOW TO WASH WOOLENS.

The washing of woolens in the laundry to avoid shrinking is a household problem solved as follows: Soak as hot as can be borne by the hand in water in which soap has been boiled. To about every six gallons of water add from three to five tablespoonfuls of liquid ammonia, which removes grease deposited by perspiration. After an hour's soaking, wash out, and refrain from rubbing or kneading the fabric. To thoroughly remove the soap, rinse out twice in lukewarm water. Iron while still damp, stretching the article to the necessary length and width. The odor of the ammonia disappears when the soap has been removed.

An alternative mode is the cold-water method. In an ordinary bucket of water, dissolve a piece of good soap, and add a teaspoonful of ammonia. Into this put the goods to soak six hours. Express the suds, by drawing through the hand or with a wringer, and rinse in cold water till the water flows off clear and clean.

APPLICATIONS OF AMMONIA.

Ammonia can be used with soap to advantage. Certain manufacturers are using sal ammoniac and speak very highly of its advantages. Where a vat with tightly fitting lid is to be had, it should be employed, since the heat is not only saved, but maintained equably, and there is not the same loss. It cleans out soap and sweetens the goods. Ammonia should not be neglected in the dye nor the finishing rooms.

ARTIFICIAL SILK.

The furore over artificial silk has somewhat subsided, and it is the general impression that too high an estimate was made of the qualities of the product. It is, however, unques-

tionable, the statements of the many interested detractors to the contrary notwithstanding, that it will be a serious rival to the natural silk in a great many applications. It is said that the prospective uses of artificial silk made under the Lehner patents are daily increasing. The company's works at Glattburg, near Zürich, Switzerland, are said to produce 3 cwt. of yarn each week, and the works are fully occupied day and night.

There are three methods to-day for the manufacture of artificial silk. One is the Chardonette, another is the Vivier, and the third is the Lehner. The Chardonette process forces a collodion solution through capillary tubes, and these filaments are coagulated, and four of them are twisted into one thread. This is de-nitrated to remove its explosive qualities.

The Vivier method starts with nitrocellulose, fish sounds, and gutta percha.

The Lehner process mixes together the collodion with a solution of pure silk waste.

The most appalling defect in artificial silk is its inability to withstand moisture. Even in the form of cloth, pure artificial silk tears with the most melancholy ease.

It has been discovered that cellulose can be dissolved by heating it with a strong solution of chloride of zinc and then adding hydrochloric acid.

A new process for artificial silk consists of three treatments: First, the threads of cotton are passed into a solution of cellulose, through a solution of cupra-ammonia, thio-carbonates, or nitro cellulose; second, the thread is then passed into a bath which coagulates these compounds of cellulose upon the fiber, and water, benzene, toluylene, or xylene are used; third, the process is completed by a bath acting as a fixation; for instance, dilute acid if the Schweitzer solution has been used, an alkaline sulpho-hydrate, an acetate of iron, or an iron chloride if nitro-cellulose has been used. In this way a thread is obtained having the appearance and all of the tinctorial properties of natural silk.

Silk gloss upon cotton yarn, hosiery, etc., is said to be producible by treating the material at 40° Centigrade with acetate of lime 5° Beaumé, then, without rinsing, working at 50° Centigrade with a bath of Marseilles soap, finally upon a 10 per cent. bath of acetic acid and drying without rinsing.

A NEW ALBUMEN PREPARATION.

The Compagnie Parisienne de Colorants d'Aniline have a patent for treating egg albumen with formaldehyde. The mixture is allowed to stand several days, when the water is added, and the formaldehyde then boiled out. The residue is filtered and dried in a vacuum pan. The product can be precipitated by acids and alcohol, and dissolved in water, and is not precipitated by alkalis.

RAMIE.

California has come forward as an aspirant for favor in the rhea fiber industry. Mr. Felix Fremerey has long been considered an authority on the subject, and his experiments at Bakersfield, Kern County, Cal., have given great impetus to the cultivation of fibrous plants.

HEMP.

California is coming into prominence as a successful manufacturer of hemp, and the yield of water-retted fiber at the farm of Mr. John Heaney, at Gridley, Cal., is about 2,600 pounds to the acre.

FLAX.

Oregon is said to be one of the best flax countries. The Oregon Women's Flax Fiber Association is engaged in bringing flax into prominence, and their efforts are untiring in advertising the possibilities of the fiber. This industry is but two or three years old, and yet the product is meeting with a good demand.

A professor at Lille has discovered the micro-organism indispensable in the retting of flax. It is the "bacille amylobacter." Other micro-organisms develop in the water during the operation, having a very noxious influence and destroying the amylobacter bacillus. The inventors constructed a building in which the decomposition of the fiber, with the aid of the amylobacter bacillus, and its drying, occur simultaneously, and the whole operation lasts five days.

TEXTILE SCHOOLS.

The Lowell Textile School was opened the first of February of this year under the very best of auspices. We give some pictures of some parts of this school and also of the Philadelphia school on pages 157 and 158. The Philadelphia Textile School, which has won for itself a wide reputation during the fourteen years of its existence, and the proposed textile schools at Fall River, Paterson, and Charlotte, give most encouraging guarantee that the next generation of mill managers and superintendents will have a training requisite for the carrying on of their industries in the most enlightened way. We have long looked for a union between practical and theoretical training, and these schools are our guarantee that this will be done and in the best manner.

In Germany there is a well-nigh universal effort to give technical training a prominent place in education, and all sizes of cities have good trade schools (Fachschulen). The Year-Book cannot do better than to quote a paragraph written by Principal L. W. Miller, of Philadelphia Textile School. "That masters and employers have reached a stage of development where they are willing to make it a part of their duty to provide systematic instruction in their trades by means of schools which are open to the apprentices of their rivals in business, as well as to their own, shows how much better than their brethren in America they have learned the importance of making common cause against a common enemy. In America we are still to a considerable extent in a state which, in this respect, is representative, not of a social order, but of savagery; that is to say, it is so far from being the rule that our employers are willing to interest themselves in making general the education which would tend to improve the quality of their productions, that the contrary would probably be more nearly true. Too many of them would rather fear than welcome the effect of this education, which simply means that they would prefer to hunt by themselves in a wilderness rather than make those concessions and render that service to the common safety and welfare which civilization demands. This is the most pressing lesson which American industry has to learn, and Germany is the country in which to learn it."

The highest types of schools of this sort in Germany are the Kunst-Gewerbe Schulen of Berlin, Nürnberg, Munich, Crefeld, and Mühlhausen, with which the admirable schools of Switzerland at Luzerne, Zürich, and Geneva are quite worthy of being classed.

In England there are the Manchester Technical School, the Leeds School, and the Central School at South Kensington, London.

The technical instruction committee of the city of Manchester recently presented its report of a deputation appointed to visit the technical schools of Germany and Austria.

"It is not, however," the committee points out, "only in the domains of science that Germany is making great progress. In almost every town visited by the deputation fine industrial art museums were found, arranged with the express purpose of cultivating a knowledge of what has already been accomplished in the production of fine examples of color, design, and workmanship. Every technical school has its special museum of objects applicable to its purposes. Notably was this the case in Berlin, Vienna, Nürnberg, Crefeld, and at Düsseldorf, in which latter place the Industrial Art Museum is said to be the finest in the Rhineland. At Nüremberg there has been recently erected, at a cost of \$250,000, a fine industrial and trade museum, known as the Bavarian Museum, to which it is intended to add laboratories and class-rooms for chemical technology."

TREATMENT OF BOILER SCALE.

Analyses of boiler scale show that it is usually made up in the following way:

	Per cent.
Sulphate of lime.....	56.5
Carbonate of magnesium.....	19.8
Carbonate of lime.....	18.0
Oxide of iron and aluminum.....	0.7
Silica	3.8
Moisture	1.6

Carbonic acid holds the lime and magnesium in solution in the form of bicarbonate. Hence, if something is added to take away that excess of carbonic acid, lime and magnesium

are precipitated. Where the lime and magnesium salts are in solution as bicarbonates, this simple addition of a substance designed to remove the excess of carbonic acid will cure the water with no further trouble. The reagent to effect this purpose is usually lime-water itself.

Sulphate of lime in the water is not altered by this process, and hence the lime-water cure is useless for such waters. Soda ash should be used. Quite frequently barium chloride can be used as a remedy for water holding sulphate of lime. Then the calcium chloride is subsequently removed by the addition of soda ash. Carbonate of barium is said to be useful where the water holds sulphate of lime, and in this case there are produced two insoluble precipitates, namely, carbonate of calcium and sulphate of barium.

A large number of substances have been suggested, and the basal idea is to form a slimy liquid which will not harden. Sugar, syrups, starch-meals, glue, tannic acid, potatoes, oils, tar, fats, etc., are used in this way. A large number of anti-incrustation powders are on the market.

COSTLINESS OF HARD WATER.

A pound of carbonate of lime or magnesia precipitates ten pounds of soap. Therefore, the evil of hard water is somewhat calculable. Not altogether, because there are losses from partly perfect goods concerning which no account can ever be taken. Iron, magnesium, calcium, and aluminum salts can be removed with attention, and then the plague of precipitated soap is avoided.

TAKING SAMPLES OF WATER FOR ANALYSIS.

A new gallon bottle and a new cork should be used. Rinse the bottle thoroughly with some of the water to be analyzed. Then fill the bottle not quite full, taking care not to have the water which goes into the bottle touch the hands. In case the water is from a spigot or cock, the end of the spigot or cock should be cleaned both inside and outside and then the water allowed to run a few minutes before sample is taken. All general information in regard to the source of supply, possible contamination, or any peculiarities of the water should be stated. Write on the label the date and hour when

the sample was taken, and for identification sign it with your name.

Boiler waters have been treated with tannic acid, which produces tannate of lime, and this being slimy will not form boiler scale. The idea of using compounds which would produce slimes and not mineral decompositions is illustrated by many of the boiler compounds at present on the market, particularly starch, potatoes, dextrine, and even glue and albuminous substances, stearine, tar, whale oil, any fatty substances or a soap. Boiler compounds have been analyzed which contained 75 per cent. logwood. Each case stands on its own merits and has to be treated in strict accordance with the individual requirements. An analysis is always necessary. It takes but very little care to obviate very large losses.

DRINKING WATER TEST.

Hager's test for potable water is a tannin solution made up of one part tannin, water 4 parts, alcohol 1 part. The addition of this solution to potable water should cause no turbidity, even after standing some time. Another test with water is to bottle some of it and keep it corked for a few days. If it is malodorous on opening, it is a suspicious case, unless it be a natural sulphur water. Another rough and ready test is to evaporate to dryness and observe the residue.

Still another experiment which may give suggestions concerning the nature of a water is to fill a good sized white glass jar, and allow it to stand for a day or so. A clouding will give a hint of bicarbonates. The natural sediment will give hints to an experienced eye.

The total solids in water supplied to American cities where a fair degree of purity is maintained, expressed in parts per million, are: Boston, 47; Philadelphia, 134; New York, 82; Washington, 165; Brooklyn, 64; New Orleans, 340; Indianapolis, 290, and Minneapolis, 186.

More than five grains per gallon of chlorine (71.4 parts per million), accompanied by more than .08 parts per million of free ammonia and more than .10 parts per million of albuminoid ammonia, is a clear indication that the water is contaminated with sewage, decaying animal matter, urine, etc., and should be condemned. Eight-hundredths parts per

million of free ammonia and one-tenth part per million of albuminoid ammonia render a water very suspicious, even without much chlorine.

Albuminoid ammonia, over .15 part per million, ought to absolutely condemn a water which contains it. The total solids found in the water should not exceed 40 grains per gallon (571.4 parts per million).

METHOD FOR ANALYZING FATTY OILS.

Take specific gravity and melting point. Use ether to find insolubles.

Five-ten grs. of the sample, previously melted is necessary, is filtered through a dry filter, unless quite clear.

RESIDUE may contain salt, curd, water, sand, and insoluble matter. It may be washed with ether, dried and weighed, then ignited and reweighed; difference is organic matter.	THE CLEAR OIL is shaken out in a separator with water and ether, or recently distilled carbon bisulphide. The aqueous liquid is separated, and the oil solution again shaken with water, if the previous treatment was found to remove anything.	
	AQUEOUS OIL LIQUID may contain soap and is evaporated at 100.	SOLUTION.—Shake again with dilute sulphuric acid and separate. If an aliquot portion of the oil solution leaves no ash on ignition, thus proving the absence of metallic compounds, the shaking out with water as above, and with sulphuric acid, can be omitted. Wash the residual oil repeatedly with water till the aqueous solution gives no test for acid with litmus.
	ACID LIQUID may contain sulphate of aluminum and heavy metals previously existing as soaps.	SOLUTION OF OIL IN ETHER OR CARBON BISULPHIDE.—Evaporate, saponify, shake repeatedly with petroleum ether. Petroleum ether solution is evaporated to determine the amount of mineral oil. Aqueous solution is acidified with petroleum ether and further examined to determine the nature of the fatty oils.

LUBRICATING OILS.

A good lubricating oil (1) should decrease the friction; (2) it should not lose its lubricating qualities by standing in the air; (3) it should not have any chemical action on the metals with which it comes in contact; (4) it should possess a certain degree of viscosity, so that it is neither pressed out from between the grinding surfaces, nor by quicker movement of the machine thrown off; (5) at the temperature at which it is used it should give off no inflammable gases or vapors. Mineral oils, fatty oils, and mixtures of the two

are used as lubricants, additions of resin oils and drying oils decrease the quality.

The specific gravity and viscosity of the oils (and the cold test, if the oils must withstand the cold of winter) should be determined.

Mineral oils, as a rule, are free from acid. Sulphuric acid remaining from the refining may be detected by shaking with warm water and testing with methyl orange, the water layer should not become red.

Nitro naphthalin is added to lubricating oils in order to destroy the fluorescence of the mineral constituent. It may be detected by extracting with alcohol. After evaporation, this alcoholic extract will leave long transparent yellowish acicular crystals.

CLASSIFICATION OF ORGANIC DYESTUFFS.

In the *Journal of the Society of Dyers and Colourists*, S. de Kostanecki classifies organic dyestuffs. He has arranged them according to the nature and the number of the chromophors, and presents the following tabular classification:

A. DYESTUFFS CONTAINING A SINGLE CHROMOPHOR.

- C: C. Dibiphenylene-ethene.
 C: O. Oxyketones, oxycoumarins, oxyflavones, oxyxanthones.
 C: N. Auramine, thioflavine, quinoline yellow.
 $\text{N} \begin{array}{l} \diagup \\ \diagdown \end{array}$ Nitro coloring-matters.
 N: N. Azo colors.
 N: N: O. Azoxy colors.

B. DYESTUFFS CONTAINING SEVERAL CHROMOPHORS.

(a) STREPTOSTATIC CHROMOPHORS (KETONE TYPE).

- C: C } Unsaturated oxyketones, indogenides, oxyindogen-
 C: C } ides, indigo.
 C: O }
 C: O } Oxydiketones, oxydixanthones.

C : N }	Hydrazone dyestuffs.
C : N }	
N : N }	Disazo dyestuffs.
N : N }	

(b) CYCLOSTATIC CHROMOPHORS (QUINONE TYPE).

	C : C.	C : O.	C : N.									
C : O ...	<table> <tr> <td>{ Aurins.....</td> <td rowspan="3">} Oxyquinones.</td> </tr> <tr> <td>{ Benzeins.....</td> </tr> <tr> <td>{ Phthaleins.....</td> </tr> </table>	{ Aurins.....	} Oxyquinones.	{ Benzeins.....	{ Phthaleins.....							
{ Aurins.....	} Oxyquinones.											
{ Benzeins.....												
{ Phthaleins.....												
C : N ...	<table> <tr> <td>{ Basic coloring matters of the triphenyl methane group.</td> <td rowspan="2">} Indophenols</td> <td rowspan="5">{ Indamiens. Azines. Safranines. Indulines.</td> </tr> <tr> <td>{ Pyronines.....</td> </tr> <tr> <td></td> <td colspan="2">{ Nitrosophenols. }</td> </tr> <tr> <td></td> <td colspan="2">{ Safranines. Indulines. }</td> </tr> </table>	{ Basic coloring matters of the triphenyl methane group.	} Indophenols	{ Indamiens. Azines. Safranines. Indulines.	{ Pyronines.....		{ Nitrosophenols. }			{ Safranines. Indulines. }		
{ Basic coloring matters of the triphenyl methane group.	} Indophenols	{ Indamiens. Azines. Safranines. Indulines.										
{ Pyronines.....												
	{ Nitrosophenols. }											
	{ Safranines. Indulines. }											
C : N : O			Rosazur'ne.									

(c) STREPTOSTATIC AND CYCLOSTATIC CHROMOPHORS.

This group comprises several complicated coloring-matters, such as alizarin blue, styrogallol, etc.

BALING.

The old-fashioned cubical cotton bale contained about 500 pounds of fiber, but it is now passing out of vogue, and the new cylindrical bale is taking its place. There is now an improvement made in the new bale, namely, that the bale is put up just thirty-five inches wide, in order to adapt it to the opener at the mill.

ANOTHER NEW BALE.

The American Cotton Bale Company is about to place on the market a new style of packing for cotton. Substantially, it is a thin galvanized iron box, held in position by steel straps. The bale weighs 18 pounds. The old style of baling weighs 28 pounds. The first form which the inventor made was an asbestos covering, held in shape by wire; this was too expensive. The second form was similar to the telescope-bag idea. The present form is a very handsome-looking bale weighing 500 pounds, and is making everywhere a very satisfactory impression among the manufacturers. The particular advantage of this bale over the round bale is the fact that

it can be filled by an inexpensive machine. The round bale requires a very expensive machine. The machine for packing this new bale costs from \$125 to \$150.

BASIC COLORS.

M. Horace Koechlin states that nitrosophenol and the naphthols are very strong mordants for the basic colors.

DYES FOR LEATHER.

Black Striker.—A powdered striker for use in logwood dyeing, of uniform strength and tone.

New Leather Black.—An aniline black for producing blue-black shades upon leather.

Tannin Brown B.—Adapted equally for the dyeing of mordanted cotton and of leather. A clear, pure brown-yellow of good fastness.

THE NEW TARIFF.

The most important acid, sulphuric acid, is taxed $\frac{3}{4}$ c. a pound. Muriatic, nitric, carbolic, and oxalic acids remain duty free. Tannic acid decreases 10c. per pound. Bleaching powder is to pay $\frac{1}{5}$ c.; last year there was imported into the United States 103,513,877 pounds, valued at \$1,579,358; this will probably yield a very considerable revenue unless our manufacturers decide to buy in this country. Coal-tar dyes are raised from 25 to 30 per cent.; last year there was imported over \$3,000,000 worth. Aniline salts are free. Also "alizerine, natural or artificial, and dyes derived from alizarin or anthracin." Nearly \$1,000,000 worth of alizerine came in last year. Coal-tar, benzol, toluol, and naphthalene remain free of duty. Extracts of logwood alter from 10 per cent. to $\frac{7}{8}$ c. Logwood extract to the value of over \$1,500,000 was imported last year. Extracts of quebracho alter from 10 per cent. to $\frac{1}{2}$ c. a pound. Extract of sumac from 10c. to $\frac{5}{8}$ c. a pound; ground sumac, 3 to 10c.; cutch and gambier are free. Indigo extracts are removed from the free list and charged $\frac{3}{4}$ c. a pound; carmined, 10c. a pound; indigo itself is free; over \$1,673,000 came in last year. Bichromate of potash is to pay 3c. in lieu of 25 per cent.; bichromate of soda, 2c. instead of 25 per cent.

This will further aid in the desirable substitution of the sodium for the potassium salt, because the tariff will increase the present disparity of 2c. a pound between the bichromes. Similar remarks might be made on chlorate of potash, which is to pay $2\frac{1}{2}$ c., and chlorate of soda, 2c. Caustic potash pays 1c.; caustic soda, $\frac{3}{4}$ c.; last year there was imported over \$1,000,000 worth of caustic soda. Soda ash is to pay $\frac{3}{8}$ c. About 120,000 tons are imported into the country.

BLEACHING.

A report from the Norwich Bleaching, Dyeing, and Printing Company states that in the last ten years 570,424,917 yards of cloth have been finished.

INVENTIONS MADE IN THE MILL.

The question concerning the ownership of inventions made by employees arises at times, and it would seem as though the management of mills would follow the method employed at the large establishments abroad, namely, make contracts with the help, so that when anything is invented, using the chemicals of a mill, it becomes the property of the firm. A man anxious for employment will never hesitate to sign such a contract if it is insisted upon at the start. It is quite another thing, however, after a man has been employed for a while and gets a warped idea of his own consequence.

It may readily be a close question whether a chemist or other employee who has done something new has a property right in the novelty, which is a *de jure* right or a *de facto*. If the invention was worked out with the chemicals and machines of the mill, the mill is apt to think that it is the owner in equity. If the workman has used extra time, then he believes himself to be the legal owner in fee.

Industrial confusion which results can be obviated by foresight in contracting against the contingency. The case of Dobson *vs.* Dempsey; the case of the Silver Spring Co. *vs.* Woolworth cost much money and trouble, all of which could have been saved.

COLLODION COVERINGS.

An English patent states a method for giving textiles, such as cotton, linen, hemp, jute, wool, and even leather, wood, gutta percha, and rubber, a color and a silk gloss in one bath. The process passes the articles through an ether-alcohol solution of collodion, to which any suitable dyestuff has been added, and then entering a closed chamber for removing the alcohol and ether and recondensing them.

The fiber is previously treated to a two per cent. solution of starch and then dried. Addition of olive oil to the collodion solution aids in rendering the result less hard. The colors are said to be absolutely fast to light, air, washing, acid, alkali, and chlorine. Whether this process is applicable to selvedges is not yet certain.

PEGAMOID.

This widely and cleverly advertised article seems to be a pliable celluloid. The suppleness is given by the use of castor-oil and the like. The uses to which this pegamoid is applicable are so manifold as to be almost bewildering. The offices of the company display numerous articles "pegamoided," and ranges from an imitation leather to wall-paper and painted articles. The manufacture of a "leather" from cotton cloth, and its application in upholstery reminds one of pantasote, which latter article is used for imitation leather window shades and gives creditable service.

ARTIFICIAL LEATHER.

An English patent covers an artificial leather prepared as follows: Unvulcanized rubber is dissolved in benzine or other solvent. Leather waste is added, and suitable coloring agents may also be employed. This is well mixed and the paste is squeezed out from the box and passes between rolls. The sheet is removed to a drying-shed and is subsequently embossed or treated as desired.

WOOL WASHINGS AS A FERTILIZER.

An analysis of wool washings, made with reference to its approximate value as a fertilizer, gave the following results:

	Per cent.
Moisture at 100° Centigrade.....	41.13
Dry matter.....	58.87

The dry matter left behind contained:

	Per cent.
Potassium oxide.....	10.15
Phosphoric acid.....	0.10
Nitrogen	1.09

The commercial value of these ingredients per ton of the original substance amounted approximately to \$12.40. Samples of raw wool tested for potash give the following results:

	Per cent.
Potassium oxide soluble in water.....	3.92
Potassium oxide soluble in diluted hydrochloric acid.	4.20

The scarcity of a good quality of carbonate of potash for manurial purposes in case of tobacco and similar industrial crops ought to encourage attempts to turn the concentrated potash liquor into a source of revenue.

FINENESS OF WOOL FIBER.

Seventy-five thousand measurements were made under the microscope in the Department of Agriculture. The Department said that it is possible to produce in the United States as fine wools as can be produced in any part of the world.

RESTORING RANCID TALLOW.

It is said that rancid tallow may be returned to usable condition by melting and adding 2 per cent. of chalk, 5 per cent. of lime water, then boiling until a scum no longer rises. This scum should be skimmed off, and the tallow should become of a clear golden yellow color. Five per cent. of sodium chloride is added, the whole mixture boiled five minutes

longer, and then the liquid should be strained through a fine cloth.

CUTCH AND GAMBIEB.

Cutch can be distinguished from gambier by treating the sample submitted for examination with normal caustic potash diluted with water four times, and then shaking up with benzole. The gambier will show a green fluorescence.

A NEW SOLVENT.

Formine is an ester formed with formic acid by heating glycerine and oxalic acid to 140° to 190°. It will dissolve many of the hitherto unused aniline dyes which are now insoluble in the ordinary solvents.

STAIN REMOVERS.

Resin stains are dissolved by chlorhydrins, especially if warm. Dichlorhydrin is a product of the action of hydrochloric-acid gas on glycerine. It boils at 176° Centigrade, and therefore is not readily inflammable. It has a pleasant, sweet, ether-like odor. As water decomposes it, the user must take care that the goods are not wet, because the acid produced by its decomposition would ruin certain goods. Since water cannot be used with it, it should be noted that the things which can be used as diluents are benzol, but not benzine, absolute alcohol, chloroform, and carbon tetrachloride.

Epichlorhydrin is made by alkalies on dichlorhydrin. Its boiling point being 117° Centigrade, it is more inflammable than chlorhydrin. It possesses an alcoholic odor, and it is not decomposed by water.

STAINS FROM STEAM.

Anti-crustating compounds, such as petroleum and coal-tar in the boilers, while in many instances are of value in preventing boiler scale, can be very disadvantageous in the matter of producing stains. It is a matter of common knowledge that many oils will distill with steam, and therefore, where vats are heated by use of dry steam, oils of various kinds may be introduced into the vat.

STAINS OF NITRATE OF SILVER.

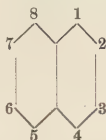
To remove the stains produced by nitrate of silver, use a concentrated solution of cupric chloride, and then wash with hyposulphite of sodium.

NUMBERING THE GRAPHIC FORMULÆ.

The numbering of the graphic formulæ when the molecule gets somewhat complex is sometimes very confusing. When one ring is used the numbering is as follows:



But when the ring is double, then the numbering and the naming is considerably more complex. The following shows a method of numbering and the names and the combinations:



1:2 Ortho; 1:3 Meta; 1:4 Para; 1:5 Ana; 1:6 Epi; 1:7 Kata; 1:8 Peri; 2:6 Amphi; 2:7 Pros.

MARKING GOODS.

The following things are used at different bleacheries: Tar and turpentine, gas-tar alone or mixed with lampblack, printers' ink, copal varnish and black pigments, manganese chloride fixed with alkali, red ochre boiled with cotton-seed oil in the proportions of 750 c.c oil to one kg. of earth.

Aniline black can be used in this way: Make up two solutions, A and B. (a) Boil 170 gr. of starch in 1 liter of water, and, when cold, mix in 60 gr. of chlorate of potash and 48 gr. of copper sulphide. (b) Boil 170 gr. of starch in 1 liter of water as before, and, when cold, stir in 170 gr. of aniline salts.

Use equal amounts of each. Copper sulphide made by heating with continual stirring, 250 gr. of sulphur, 1 liter of caustic soda of 36° Beaumé, and 1,200 gr. of copper sulphate in 20 liters of water. Filter before using.

MISAPPLICATION OF SULPHURIC ACID IN WOOL-DYEING.

No dyeing assistant is more open to misuse than sulphuric acid. The object of using sulphuric acid at all is to set free the color, and as it is relatively quite a cheap article, many dyers use too much of it. If a dyeing bath for woolen cloth is too acid, the dye leaps on to the fiber and irregularities are shown in the result. Certain colors are more sensitive than others to the aid of sulphuric acid, and where a dye is very quick to go on to the fiber, it is often essential to boil the goods in a bath containing only the dyestuff and Glauber's salts, and subsequently adding acid.

ACETIC ACID AS AN AUXILIARY.

Of all acids, acetic acid is perhaps the most useful. There are many dyestuffs on the market which have the capacity to dye too quickly in presence of sulphuric acid. For such dyes acetic acid is well adapted. It causes a slower exhaustion of the dye-bath than sulphuric acid, and as a result the shades obtained are even. It ought to be used for half-woolen goods, since sulphuric acid weakens cotton and takes off the color. Many dyers do not recognize the value of this acid, but acquaintance will no doubt cause a more extensive use of it.

COLOR CONTRASTS.

Colors may be divided into primary, secondary, and tertiary classes:

PRIMARIES.—Red, yellow, and blue.

SECONDARIES.—Green, by mixing blue and yellow. Orange, by mixing red and yellow. Purple, by mixing red and blue.

TERTIARIES.—Russet, by mixing orange and purple. Citrine, by mixing orange and green. Olive, by mixing purple and green.

The following is a tabular view of complementary colors:

Red to green.

Yellow to purple.

Blue to orange.

Green to red.

Purple to yellow.

Orange to blue.

One of the chief things in all combinations is that the contrast shall be distinct and well balanced.

Colors which are complementary become intensified by contact. If you place together two colors which contain the same common element, such as yellow and green, they suffer; yellow and orange will not give a good combination, because the yellow element is too evident, detracting from the red in the orange composition.

HELP IN CASE OF ACCIDENTS.

Drowning. 1. Loosen clothing. 2. Empty lungs of water by laying body on its stomach, and lifting it by the middle so that the head hangs down. Jerk the body a few times. 3. Pull tongue forward, using handkerchief, or pin with string, if necessary. 4. Imitate motion of respiration by alternately compressing and expanding the lower ribs, about twenty times a minute. Alternately raising and lowering the arms from the sides up above the head will stimulate the action of the lungs. Let it be done gently but persistently. 5. Apply warmth and friction to extremities. 6. By holding tongue forward, closing the nostrils, and pressing the "Adam's apple" back (so as to close entrance to stomach), direct inflation may be tried. Take a deep breath and breathe it forcibly into the mouth of patient, compress the chest to expel the air, and repeat the operation.

Burns and Scalds. Cover with cooking soda and lay wet cloths over it. Whites of eggs and olive oil. Olive oil or linseed oil, plain, or mixed with chalk or whiting. Sweet or olive oil and lime-water.

Lightning. Dash cold water over a person struck.

Sunstroke. Loosen clothing. Get patient into shade, and apply ice-cold water to head. Keep head in elevated position.

Mad Dog or Snake Bite. Tie cord tight above wound. Suck the wound and cauterize with caustic or white hot iron at once, or cut out adjoining parts with a sharp knife. Give stimulants as whiskey, brandy, etc.

Fainting. Place flat on back; allow fresh air, and sprinkle with water. Place head lower than rest of body.

Cinders in the Eye. Roll soft paper up like a lamplighter, and wet the tip to remove, or use a medicine dropper to draw it out. Rub the *other* eye.

Fire in a Building. Crawl on the floor. The clearest air is the lowest in the room.

Fire from Kerosene. *Don't use water*, it will spread the flames. Dirt, sand, or flour is the best extinguisher, or smother with woolen rug, table-cloth, or carpet.

Suffocation from Inhaling Illuminating Gas. Get into the fresh air as soon as possible and lie down. Keep warm. Take ammonia—twenty drops to a tumbler of water, at frequent intervals; also, two to four drops tincture of *nux vomica* every hour or two for five or six hours.

ANTIDOTES FOR POISONS.

Induce vomiting, by drinking hot water or strong mustard and water. Swallow sweet oil or whites of eggs.

SPECIAL POISONS AND ANTIDOTES.

Acids. Muriatic, oxalic, acetic, sulphuric, nitric. *Soap-suds, magnesia, lime-water.*

Prussic acid. *Ammonia in water. Dash water in face.*

Carbolic acid. *Flour and water, mucilaginous drinks.*

Alkalies. Such as potash, lye, hartshorn, ammonia. *Vinegar or lemon-juice in water.*

Arsenic, rat poison, Paris green. *Milk, raw eggs, sweet oil, lime-water, flour and water.*

Bug poison, lead, saltpetre, corrosive sublimate, sugar of lead, blue vitriol. *Whites of eggs or milk in large doses.*

Chloroform, chloral, ether. *Dash cold water on head and chest. Artificial respiration. Piece of ice in rectum. No chemical antidote.*

Carbonate of soda, copperas, cobalt. *Soap-suds, and mucilaginous drinks.*

Iodine, antimony, tartar emetic. *Starch and water. Astringent infusions. Strong tea, tannin.*

Mercury and its salts. *Whites of eggs, milk, mucilages.*

Nitrate of silver, lunar caustic. *Salt and water.*

Opium, morphine, laudanum, paregoric, soothing powders or syrups. *Strong coffee, hot bath. Keep awake and moving at any cost.*

Strychnine, tincture of nux vomica. *Mustard and water, sulphate of zinc. Absolute quiet. Plug the ears.*

POSTAL INFORMATION.

FIRST-CLASS MATTER.

This class includes letters, postal cards, and anything sealed or otherwise closed against inspection, or anything containing writing not allowed as an accompaniment to printed matter under class three.

The rate on matter of this class is two cents per ounce or fraction thereof.

SECOND-CLASS MATTER.

This class includes all newspapers, periodicals, or matter exclusively in print and regularly issued at stated intervals as frequently as four times a year.

The rate on matter of this class is one cent per pound or fraction thereof.

THIRD-CLASS MATTER.

Mail matter of the third class includes printed books, pamphlets, engravings, circulars (in print or by the hectograph, electric pen, or similar process), and other matter wholly in print, proof-sheets, corrected proof-sheets, and manuscript copy accompanying the same.

The rate on matter of this class is one cent for each two ounces or fraction thereof.

FOURTH-CLASS MATTER.

Fourth-class matter is allailable matter not included in the three preceding classes, which is so prepared for mailing as to be easily withdrawn from the wrapper and examined. It embraces merchandise and samples of every description, and coin or specie.

Such articles as poisons, explosives, or inflammable articles,

live animals, insects, or substances exhaling a bad odor will not be forwarded in any case.

The regulations respecting the mailing of liquids are as follows: Liquids, not ardent, vinous, spirituous, or malt, and not liable to explosion, spontaneous combustion, or ignition by shock or jar, and not inflammable (such as kerosene, naphtha, or turpentine), may be admitted to the mails for transportation within the United States. When contained in glass bottles or vials, such bottles or vials must be strong enough to stand the shock of handling in the mails, and must be enclosed in a wooden or papier-maché block or tube not less than three-sixteenths of an inch in the thinnest part, strong enough to support the weight of mails piled in bags and resist rough handling; and there must be provided, between the bottle and its wooden case, a cushion of cork-crums, cotton, felt, asbestos, or some other absorbent, sufficient to protect the glass from shock in handling; the block or tube to be impervious to liquids, including oils, and to be closed by a tightly fitting screw-lid of wood or metal, with a rubber or other pad so adjusted as to make the block or tube water-tight and to prevent the leakage of the contents, in case of breaking of the glass. When enclosed in a tin cylinder, metal case, or tube, such cylinder, case, or tube should have a screw-lid with a rubber or cork cushion inside in order to make the same water-tight, and should be securely fastened in a wooden or papier-maché block (open only at one end), and not less in thickness and strength than above prescribed. It would be well always to consult the postmaster in reference to the proposed mailing of liquids. The limit of admissible liquids and oils is not exceeding four ounces, liquid measure.

Limit of weight of fourth-class matter (excepting liquids), four pounds.

The rate on matter of this class is one cent for each ounce or fraction thereof.



VIEWS IN THE DYEING DEPARTMENT OF THE LOWELL TEXTILE SCHOOL.



The Philadelphia Textile School issues an attractive catalogue and announces a course of study which goes far toward making it unnecessary for American students to go abroad for their training in Textile Chemistry, Dyes and Dyeing. A visit to the school impresses one with the fact that there is the right atmosphere about the place. This right atmosphere, or an earnest and general air of strict attention to the matter in hand, finds its best exemplification in very few American institutions. It is, however, the pre-requisite to the manufacture of well-equipped alumni, which alumni are the measure of success or the non-success of any place of learning.

There may be some question whether the course of study goes far enough, but that is a matter most readily remedied as time goes on.

PART IX.—DYE ANALYSIS.

DYE ANALYSIS.

EXPLANATION OF THE TABLES.

The following is a tabular view which has been used in the laboratory successfully for locating a dye.

The tables are arranged in the spectrum order—violet, blue, green, yellow, orange, and red. The reagents employed are sulphuric acid, water, hydrochloric acid, caustic soda, and a few other reagents of incidental advantage for characteristic reactions.

The method of testing is to place concentrated sulphuric acid in a porcelain dish and then to scatter the dye in question on to the sulphuric acid. The color will either change to one of the spectrum colors or remain unchanged, and the colors to which the dyes turn have been written in columns arranged in spectrum order, and the name of the dye which has been changed is written in that column marked violet, blue, green, etc., to which the acid has altered it.

Then water is added to the test made with concentrated sulphuric acid. There is a change, as a rule, in the color, and the name of the dye is written in the column marked the color to which the dye turns.

A water solution is made of the dye and hydrochloric acid is added; the changes in the colors have been arranged in spectrum order, and, as before, the name of the dye changing respectively to violet, etc., is written in that column.

The water solution is furthermore treated with a caustic soda solution.

Abbreviations used are sol. for solution; ppt. for precipitate. Unless otherwise mentioned, solutions are intended.

The numbers placed after each dye are the numbers from "Schultz's Tabellarische Uebersicht der Künstlichen Organischen Farbstoffe," 3rd edition, Berlin, 1897.

RED—Continued.	
Fast acid violet A 2 B.....	349. Yellow-red.
Violamine B.....	
VIOLET.	
On addition of H₂O to H₂SO₄ solution.	
BLACK :	
Fast violet reddish.....	148. { Clear gray, on dilu- tion red-violet ppt.
WHITE :	
Chrome violet powder.....	333. Ppt. color acid.
VIOLET :	
Chromotrope 10 B.....	£3. Red-violet.
Chromotrope S B.....	100.
Fast violet reddish.....	148. { On dilution red-violet ppt.
Fast violet bluish.....	151. Ppt.
Diamine violet N.....	180. Red-violet ppt.
Congo corinth G.....	183. Ppt.
Heliotrope 2 B.....	185. Red-violet.
Bordeaux extra.....	
Congo violet.....	186. Ppt.
Bordeaux C O V.....	188. Ppt.
Oxamine violet.....	
Azomaune B.....	212. Blue-violet ppt.
Azomaune R.....	214. Ppt.
Congo Corinth B.....	214. Ppt.
Heliotrope B.....	222. Blue-violet ppt.
Hessian violet.....	249. Ppt.
Methyl violet B and 2 B.....	
Methyl violet V 3.....	303. { Yellow-green, then green-blue, then violet.
Violet de Paris.....	
Violet au Methyl B.....	
Violet soluble (non plus ultra)	
Crystal violet 5 B O, O.....	304. { Green, then blue into violet.
Violet C.....	305. { Green, then blue then violet.
Ethyl violet.....	

YELLOW :	
Hoffman's violet.....	302. Brown-yellow.
Methyl violet B and 2 B.....	
Methyl violet V 3.....	303.
Violet de Paris.....	
Violet au methyl B.....	
Violet soluble (non plus ultra).....	
Crystal violet.....	304.
Crystal violet 5 B O, O.....	
Violet C.....	305.
Aethyl violet.....	
Benzyl violet.....	
Paris violet 6 B, 7 B.....	306.
Methyl violet 6 B, 7 B.....	
Violet 5 B, 6 B, 7 B.....	
Violet au Methyl 6 B.....	
Red violet 5 R S.....	311.
Acid violet 4 B N, 6 B, 7 B, N.....	312.
Red violet 4 R S.....	313.
Acid violet 4 R S.....	
Fast acid violet 10 B.....	314. Orange-yellow.
Formyl violet S 4 B.....	317. Orange-yellow.
Acid violet 4 B extra.....	
Fast acid blue B.....	348. Red-yellow.
Violamine B.....	
Gallein in paste.....	
Gallein A in paste.....	
Alizarins violet.....	366. Red-yellow.
Anthracene violet.....	
RED :	
Wool violet S.....	36. Scarlet-red.
Victoria violet 4 B S.....	
Victoria violet 8 B S.....	38. Blue-red.
Azo acid blue B.....	
Alkali violet.....	318. Yellow-red.
Acid violet 6 B N.....	319. Orange-red.
Acid violet 7 B.....	320. Orange-red.

VIOLET—Continued.

VIOLET—Continued.		VIOLET—Continued.	
Benzyl violet.....		Paraphenylene violet.....	
Paris violet 6 B, 7 B.....	{ 306. }	.....	473. First blue.
Methyl violet 6 B.....		.....	293.
Methyl violet 7 B.....		Hofmann's violet.....	{ Olive - green, then green, then blue.
Violet 5 B, 6 B.....	{ 319. }	.....	{ 302. }
Violet 7 B.....		Acid violet 4 B N, 6 B, 7 B, N.....	{ Olive, then green, then blue.
Violet au Méthyl 6 B.....		.....	{ 312. }
Acid violet 6 B N.....	320.	Formyl violet S 4 B.....	{ 317. }
Acid violet 7 B.....	{ 318. }	Acid violet 4 B extra.....	{ green, then blue.
Fast acid blue B.....		.....	{ 348. }
Violamine B.....		Violamine B.....	{ Violet sol., later blue flocks.
Violet neutre.....	448.	Neutral violet.....	448.
Violet neutre extra.....	{ 460. }	Violet neutre extra.....	{ Blue, then violet.
Fast neutral violet B.....		Fast neutral violet B.....	{ Blue, then blue-violet, then red-violet.
Violet neutre solide B.....		Violet neutre solide B.....	{ 462. }
Clematine.....	{ 463. }	Methylene violet R R A.....	{ Blue, then violet-red.
Safranine M N.....		Methylene violet 3 R A.....	{ Fuchsia.....
Amethyst violet.....		Clematine.....	463.
Mauveine.....	{ 467. }	Safranine M N.....	{ Blue, then red-violet.
Rosolan.....		Heliotrope B, 2 B.....	464.
Violet paste.....		Tannin Heliotrope.....	{ Blue, then red.
Chrome violet.....	{ 467. }	Giroflé.....	465.
Mauve.....		Amethyst violet.....	{ Blue, then blue-violet.
Mauve dye.....		Rosolan.....	{ First blue, then red.
Aniline.....	{ 467. }	Mauveine.....	{ First green, then blue, then red-violet.
Aniline violet.....		Rosolan.....	{ 467. }
Aniline purple.....		Violet paste.....	{ 467. }
Violeine.....	{ 467. }	Chrome violet.....	{ 467. }
Pertkins violet.....		Mauve.....	{ 467. }
Indisine.....		Mauve dye.....	{ 467. }
Phenamine.....	{ 467. }	Aniline.....	{ 467. }
Phenamine.....		Aniline violet.....	{ 467. }
Purpurine.....		Aniline purple.....	{ 467. }
Tyraline.....	{ 467. }	Violeine.....	{ 467. }
Tyrian purple.....		Pertkins violet.....	{ 467. }
Lydine.....		Indisine.....	{ 467. }

GREEN—Continued.

Mauveine.....	467.	{ First green, then blue, then red-violet.
Rosulan.....		
Violet paste.....		
Chrome violet.....		
Mauve.....		
Mauve dye.....		
Aniline.....		
Aniline violet.....		
Aniline purple.....		
Violeline.....		
Perkins violet.....		
Indisine.....		
Phenamine.....		
Purpurine.....		
Tyraline.....		
Tyrian purple.....		
Lydine.....		
BROWN:		
Chrome violet paste.....	296.	Red-brown.
Regina purple.....		
Regina violet.....	307.	
Violet impérial (phenylique).....		
Acid violet 6 B.....	316.	{ First dark brown, then blue-green.
YELLOW:		
Fast acid violet 10 B.....	314.	Lemon yellow.
RED:		
Wool violet S.....	36.	Orange-red.
Victoria violet 4 B S.....		
Victoria violet 8 B S.....	88.	Yellow-red ppt.
Azo acid blue B.....		
Red violet 5 R S.....	311.	Fuchsine red.
Red violet 4 R S.....		
Acid violet 4 R S.....	313.	Fuchsine red.
Acid violet 6 B N.....	319.	{ Violet-red, then blue-violet.

BLUE—Continued.

Aniline violet.....		
Aniline purple.....		
Violeline.....		
Perkins violet.....	467.	{ First green, then blue, then red-violet.
Indisine.....		
Phenamine.....		
Purpurine.....		
Tyraline.....		
Tyrian purple.....		
Lydine.....		
Paraphenylene violet.....	473.	Blue, then violet.
GREEN:		
Hofmann's violet.....	302.	{ Olive-green, then green, then blue.
Methyl violet B and 2 B.....		
Methyl violet V 3.....		
Violet de Paris.....	303.	{ Yellow-green, then blue-green, then violet.
Violet au Méthyl B.....		
Violet soluble (non plus ultra).....		
Crystal violet 5 B O, O.....	304.	{ Green, then blue into violet.
Violet C.....		
Æthyl violet.....	305.	Green, blue, then violet.
Benzyl violet.....		
Paris violet 6 B, 7 B.....		
Methyl violet 6 B, 7 B.....	306.	{ Yellow-green, then green-blue, then violet.
Violet 5 B, 6 B, 7 B.....		
Violet au Méthyl 6 B.....		
Acid violet 4 B N, 6 B.....		
Acid violet 7 B, N.....	312.	{ Olive, then green, then blue.
Acid violet 6 B.....	316.	{ Dark brown, then blue-green.
Formyl violet S 4 B.....		
Acid violet 4 B extra.....	317.	{ First olive-green, then green, then blue.
Alkali violet.....	318.	dirty green ppt.

BLUE—Continued.		
Fast acid violet B.....	348.	Flocks.
Violamine B.....	480.	With excess.
Fast neutral violet B.....	462.	
Violet neutre solide B.....	463.	
Methylene violet R R A.....	464.	
Methylene violet 3 R A.....	465.	
Clematine.....	466.	
Safranine M N.....	473.	
Heliotrope B, 2 B.....	302.	First green then yellow.
Tannin heliotrope.....	316.	Blue-green.
Giroflé.....	320.	Grass green.
Amethyst violet.....	466.	On large excess, first blue, then green.
Rosolan.....	473.	Ppt.
Paraphenyliene violet.....	302.	First green then yellow.
Hofmann's violet.....	316.	Blue-green.
Acid violet 6 B.....	320.	Grass green.
Acid violet 7 B.....	466.	On large excess, first blue, then green.
Rosolan.....	473.	Ppt.
GREEN:		
Hofmann's violet.....	302.	First green then yellow.
Acid violet 6 B.....	316.	Blue-green.
Acid violet 7 B.....	320.	Grass green.
Rosolan.....	466.	On large excess, first blue, then green.
Brown:		
Chrome violet.....	296.	Red-brown.
Red violet 5 R extra.....	802.	Yellow-brown.
Violet 4 R, N, 5 R.....	307.	On dilution blue.
Violet E, R B.....	315.	Violet, with excess red-brown.
Regina purple.....	366.	Yellow-brown.
Regina violet.....	366.	Yellow-brown.
Violet imperial (phenylque).....	366.	Yellow-brown.
Acid violet 6 B N.....	366.	Yellow-brown.
Gallein in paste.....	366.	Yellow-brown.
Gallein A, in paste.....	366.	Yellow-brown.
Alizarine (Anthracene) violet.....	366.	Yellow-brown.
YELLOW:		
Hofmann's violet.....	302.	First green, then yellow.
Crystal violet.....	304.	Blue, then green, then yellow.
Crystal violet 5 B O, O.....	305.	Red-yellow.
Violet C.....	314.	Lemon yellow.
Æthyl violet.....	314.	Lemon yellow.
Fast acid violet 10 B.....	314.	Lemon yellow.
RED:		
Wool violet S.....	36.	Orange-red.
Victoria violet 4 B S.....	38.	Yellow-red.
Victoria violet 5 B S.....	38.	Yellow-red.
Azo acid blue B.....	318.	Blue ppt., excess acid yellowish-red sol.
Alkali violet.....	319.	Violet-red, with excess red-brown.
Acid violet 6 B N.....	349.	Blue-red flocks.
Fast acid violet A 2 R.....	418.	Pale fuchsine red.
Violamine R.....	419.	
Gallo cyanine D H, B S.....	419.	
Solid violet (Fast violet).....	419.	
Prune pure.....	419.	
Parme R paste.....	419.	
NO REACTION:		
Chromotrope 10 B.....	63.	
Chromotrope 8 B.....	100.	
Red violet 5 R S.....	311.	
Red violet 4 R S.....	313.	
Acid violet 4 R S.....	448.	With large excess blue.
Neutral violet.....	464.	With large excess blue.
Violet neutre extra.....	466.	With large excess first blue, then green.
Heliotrope B, 2 B.....	466.	With large excess first blue, then green.
Tannin heliotrope.....	466.	With large excess first blue, then green.
Giroflé.....	466.	With large excess first blue, then green.
Rosolan.....	466.	With large excess first blue, then green.

RED—Continued.

Heliotrope 2 B.....	185.	Turns redder.
Gongo corinth B.....	214.	Cherry-red.
Azo violet.....	233.	Fuchsine red.
Hofmann's violet.....	302.	Brown-red ppt.
Methyl violet B, 2 B.....		
Methyl violet V 3.....		
Violet de Paris.....	303.	{ Brown-red sol. and ppt.
Violet au méthyl B.....		
Violet soluble.....		
Violet non plus ultra.....		
Benzyl violet.....		
Paris violet 6 B, 7 B.....		
Methyl violet 6 B, 7 B.....	306.	{ Brown-red sol. and ppt.
Violet 5 B, 6 B, 7 B.....		
Violet au méthyl 6 B.....		
Methylene violet R R A.....		
Methylene violet 3 R A.....	462.	Brown-red ppt.
Fuchsia.....		
Clematine.....	463.	{ Dark red ppt., on dilution soluble with red-violet color.
Safranine M N.....		
Heliotrope B, 2 B.....		
Tannin heliotrope.....	464.	Ppt. soluble in water.
Girofle.....		

NO REACTION:

Chromotrope 8 B.....	100.
Diamine violet N.....	180.
Heliotrope B.....	232.
Fast acid violet 10 B.....	314.
Fast acid violet B.....	
Violamine B.....	348.
Fast acid violet A 2 B.....	349.
Violamine R.....	
Fast neutral violet B.....	
Violet neutre solide B.....	460.
Amethyst violet.....	465.

BROWN—Continued.

Gallein in paste.....		
Gallein A in paste.....		366.
Alizarine violet.....		
Anthracene violet.....		
BROWN:		
Fast violet reddish.....	148.	Ppt., sol. turns bluer.
Red violet 5 R extra.....		
Violet 4 R N, 5 R, R R.....	303.	Ppt.
Regina purple.....		
Regina violet.....	307.	Ppt.
Violet impérial (phenylique).....		
Chrome violet powder.....	333.	Light brown.
Prune pure.....		
Parne B (paste).....	419.	{ Brown ppt., with excess violet sol.
Neutral violet.....		
Violet neutre extra.....	448.	Ppt.
Paraphenylen violet.....	473.	Ppt.
COLORLESS:		
Æthyl violet.....	305.	{ Gray-violet, ppt., on warming colorless, leaving a brown oil.
Acid violet 4 B N, 6 B, 7 B N.....	312.	{ Blue flocks, on warming colorless.
Acid violet 6 B.....	316.	{ Dil., light blue; conc., colorless.
Formyl violet S 4 B.....		
Acid violet 4 B extra.....	317.	{ Blue flocks, on warming colorless.
Acid violet 6 B N.....	319.	Slowly bleached.
Acid violet 7 B.....	320.	{ Blue-violet ppt., on warming colorless.
BROWN:		
Chromotrope 10 B.....	63.	Yellow-red.
Gongo corinth G.....	183.	Cherry-red.

BLUE.

On H_2SO_4 .

BLACK:		
Metaphenylene blue B.	469.	Blue-gray.
VIOLET:		
Safran azurine	254.	
Delphin blue	417.	Red-violet.
Gallani indigo P.	424.	Red-violet.
Gallani indigo P S.	427.	Red-violet.
Coréine A R.	427.	Red-violet.
Coréine A B.	455.	Brown-violet.
Neutral blue.		
BLUE:		
Diamine blue B B.	189.	Green-blue.
Benzo blue B B.		
Congo blue 2 B X.	211.	
Azo black blue.	216.	
Diamine blue B X.	217.	
Benzo blue B X.		
Diamine blue 3 B.	218.	Greenish-blue.
Benzo blue 3 B.		
Congo blue 3 B.		
Oxamine blue 3 R.	219.	Clear blue.
Direct blue R.	223.	
Diamine blue 3 R.	224.	Dark blue.
Diamine blue B.	227.	
Diamine blue black E.		
Noir bleu.	228.	Black-blue.
Diamine E.		
Benzo azurine G.	235.	
Benzol blue G.		
Cotton blue G.		
Benzo azurine 3 G.	236.	
BLUE—Continued.		
Brilliant azurine 5 G.	238.	Green-blue.
Direct blue B.	239.	Green-blue.
Naphthyl blue 2 B.	257.	Clear blue.
Benzo black blue R.	264.	
Benzo indigo blue.	265.	Green-blue.
Alizarine cyanine R in paste.	406.	
Alizarine cyanine 2 R, 3 R, R A extra.		
Anthracene blue W R.	409.	{ Violet-blue color and brown-red fluorescence.
Anthracene blue W B.	411.	
Gallamine blue.	420.	
Coréine R R.	421.	
Celeste blue B.		
Phenocyanine	422.	{ First brown, turning blue slowly.
Gallazine A.	423.	
Coreine	426.	
Fluorescent blue.		
Iris blue.	428.	
Fast blue R & B alcohol soluble.		
Solid blue R & B alcohol soluble.		
Induline alcohol soluble.		
Azine blue alcohol soluble.		
Indigene D, F.		
Indophenine extra.		
Blue C B alcohol soluble.		
Printing blue		
Printing blue H		
Printing blue R & B.	474.	
Acetine blue.		
Nigrosine alcohol soluble.		
Noir à l'alcool.		
Couplers blue.		
Bleu Comptier à l'alcool		
Noir C N N		

GREEN—Continued.

New blue B.....		
New blue G.....		
Fast blue 2 B for cotton.....		
Metamine blue B, G.....	430.	Dirty green.
Fast cotton blue B.....		
Fast navy blue R M, G M.....		
Naphthol blue B.....		
Muscarine.....	434.	Blue-green.
Campanuline.....		
Gentianine.....	439.	Yellow-green.
Methylene blue B, B G.....		
Methylene blue B B, extra D.....		
Methylene blue B B, in powder extra.....	440.	Yellow-green.
Methylene blue D, B extra.....		
Methylene blue B B crystals.....		
Æthylene blue.....		
Thionin blue G, O extra.....	442.	
Thiocarmine R, R en pâte.....	443.	Yellow-green.
Toluidine blue O.....	444.	Yellow-green.
New methylene blue N.....	445.	
Brilliant alizarine blue G, R.....	446.	Blackish-green.
Indazine M.....	468.	Blue-green.
Naphthazine blue.....	470.	Blue-green.
Fulling blue.....	471.	
BROWN:		
Indoline blue R.....	73.	Greenish-brown.
Methyl alkali blue.....		
Alkali blue D.....	321.	Red-brown.
Alkali blue 6 B.....		
Evansian blue D S F.....		
Methyl blue water soluble.....	323.	Yellowish-brown.
Methyl blue for silk M L B.....		
Navy blue B.....		
Methyl blue.....		
Methyl blue for cotton.....		
Brilliant cotton blue greenish.....	324.	Red-brown.
Methyl water blue.....		
Cotton blue.....		

BLUE—Continued.

Fast blue R.....		
Fast blue 3 R.....		
Bien solide R, 3 R.....		
Fast blue B.....		
Fast blue 6 B.....		
Fast blue greenish.....		
Solid blue R & B water soluble.....	475.	
Solid blue.....		
Blue C & B water soluble.....		
Induline.....		
Induline R & B.....		
Induline 3 B.....		
Nigrosene water soluble.....		
Gray R & B.....		
Bien de Bengale.....		
Paraphenylene blue R.....	476.	
Fast new blue for cotton.....	477.	
Tolylene blue B for cotton.....	478.	
Para blue.....		
GREEN:		
Diamine pure blue.....	237.	Blue-green.
Benzo pure blue.....		
Congo pure blue.....	239.	Black-green.
Benzo black blue G.....	267.	Black-green.
Benzo black blue 5 G.....	416.	
Capri blue G N.....		
New blue E.....		
New cotton solid blue.....		
Naphthylene blue R in crystals.....		
Fast blue R for cotton in crystals.....		
Cotton blue R.....		
Fast navy blue.....		
Fast cotton blue R, R R, 3 R crystals.....	429.	Blackish-green.
Phenylene blue.....		
Bien nouveau P.....		
Fast blue III R.....		
Fast navy blue R M, M M.....		
Naphthol blue R, D.....		
Fast blue for cotton.....		
Meldolas blue.....		

YELLOW—Continued.

Nile blue A.....	432.
Basel blue S.....	451.

RED:

Alkali blue.....	392.	Brown-red.
Nicholsen blue.....	396.	Brown-red.
Fast blue.....	399.	Dark Bordeaux red.
Blau alcaïn.....	351.	Dark Bordeaux red.
Chromé bleu.....	392.	Carmoisine-red.
Hoechst new blue.....	407.	Currant red.
Alizarine blue B.....	412.	Blue-red.
Alizarine blue G.....	433.	Brown-red.
Alizarine blue A, D, N, W, F, R, R, R.....		
Alizarine blue A, B.....		
Alizarine cyanin G in paste.....		
Acid alizarine B and G R.....		
Nile blue 2 B.....		

BLUE.

On Addition of H₂O to H₂SO₄ Solution.

VIOLET:

Indoline blue R.....	73.	First green sol., then violet ppt.
Diamine blue B.....	189.	
Benzo blue B.....		
Congo blue 2 B X.....	211.	Blue-violet ppt.
Azo black-blue.....	216.	Ppt.
Azo blue.....	217.	Ppt.
Diamine blue B X.....		
Benzo blue B X.....		
Congo blue B X.....		
Diamine blue 3 B.....	218.	Ppt.
Benzo blue 3 B.....		
Congo blue 3 B.....		

VIOLET—Continued.

Oxamine blue 3 R.....	219.	Ppt.
Direct blue R.....	223.	Ppt.
Diamine blue 3 R.....	226.	Ppt.
Benzo azurine G.....	235.	Blue-violet ppt.
Bengal blue G.....		
Cotton blue G.....	236.	Ppt.
Benzo azurine 3 G.....	239.	Ppt.
Direct blue E.....	234.	Black-violet ppt.
Sulfon azurine.....	237.	Ppt.
Naphthyl blue 2 R.....	264.	Blue-violet ppt.
Benzo black-blue R.....	251.	Red-violet sol., then blue floccs.
Fast acid blue R.....		
Violamine 2 R.....	428.	Later red-brown ppt.
Fluorescent blue.....		
Iris blue.....		
New blue B.....		
New blue G.....		
Fast blue 2 B for cotton.....	430.	Dirty violet, then blue.
Metamine blue B, G.....		
Fast cotton blue B.....		
Fast navy blue R, M, G, M.....		
Naphthol blue B.....	433.	Ppt.
Nile blue 2 B.....	434.	Later violet, then violet ppt.
Muscarine.....	439.	First blue, then blue-violet.
Campanuline.....	446.	Ppt.
Gentianin.....	455.	
Brilliant alizarine blue G, R.....		
Neutral blue.....	456.	First green, then violet let sol., then violet ppt.
Basel blue B in paste.....		
Basel blue B.....		
Fast blue R.....		
Fast blue 3 R.....		
Blau solide R, 3 R.....		
Fast blue B.....		
Fast blue 6 B.....	475.	
Fast blue greenish.....		

BLUE—Continued.

GREEN—Continued.

Patent blue A.....	294.	{ Later ppt. of sulfonic acid.
Fast wool blue.....	315.	
Alpine blue.....	334.	{ First yellow, excess water green, then blue.
Victoria blue B.....	335.	{ Light green.
New Victoria blue.....	336.	{ Later blue.
Victoria blue R.....	337.	{ Later blue.
Victoria blue 4 R.....	431.	{ Later blue.
New methylene blue G G.....	432.	{ Later blue.
Bleu méthylène nouveau N GG.....	456.	{ Later violet sol., then violet ppt.
Nile blue A.....		
Basel blue R in paste.....		
Basel blue B B.....		

BROWN :

Chrome blue..... 339. Red-brown.

Alizarine blue S in powder, also in paste..... 393. Ppt.

Anthracene blue S.....

Alizarine blue.....

Soluble powder A B S.....

Indophenol in powder..... 414. Ppt.

COLORLESS :

Cyanine..... 435.

Chromoline blue.....

YELLOW :

Patent blue V, N, superfine, conc..... 292. Later green.

Ketol blue 4 B N, G, R..... 293. Later green.

Cyanine B..... 334. Excess water green, then blue.

Victoria blue B.....

Victoria blue B S alcohol soluble.....

YELLOW—Continued.

Coreine A R..... 427.

Coreine A B.....

RED :

Alizarine blue in paste.....

Alizarine blue R, G W..... 392. Yellow red.

Alizarine blue A, D N W.....

Alizarine blue F, R, R R.....

Alizarine blue A B..... 412.

Acid alizarine blue B B and G R..... 416.

Capri blue G N.....

Coreine R R..... 421. Fuchsine red.

Celeste blue B.....

Gallianil indigo P..... 424. Yellow-red.

Gallianil indigo P S.....

Coreine..... 426.

NO REACTION :

Paraphenylenic blue R..... 476.

Fast new blue for cotton.....

BLUE.

On Addition of HCl to Water Solution.

VIOLET :

Diamine blue B B..... 189. Ppt.

Benzo blue B R.....

Congo blue 2 B X..... 211. Blue-violet ppt.

Azo black-blue..... 216. Ppt.

Diamine blue B X..... 217. Ppt.

Benzo blue B X.....

Congo blue B X.....

Diamine blue 3 B.....

Benzo blue 3 B.....

Congo blue 3 B.....

Oxamine blue 3 R..... 219. Ppt.

Reader, on excess violet ppt.

VIOLET—Continued.

Direct blue R.....	223.	Ppt.
Benzo azurine G.....	235.	Ppt.
Bengal blue G.....	236.	Blue-violet ppt.
Cotton blue G.....	237.	Blue-violet ppt.
Benzo azurine 3 G.....	257.	Ppt.
Naphthyl blue 2 B.....	264.	Blue-violet ppt.
Benzo black-blue R.....	265.	Blue-violet ppt.
Benzo indigo-blue.....	424.	Red-violet.
Gallani indigo P.....		
Gallani indigo P S.....		
New blue R.....		
New cotton solid blue.....		
Naphthylene blue R in crystals.....		
Fast blue R for cotton in crystals.....		
Cotton blue R.....		
Fast navy blue.....		
Fast cotton blue R, R ₁ , 3 R crystals.....	429.	Later blue.
Phenylene blue.....		
Bien nouveau P.....		
Fast blue III R.....		
Fast navy blue R M, M M.....		
Naphthol blue R, D.....		
Fast blue for cotton.....		
Meldolas blue.....		
New blue B.....		
New blue G.....		
Fast blue 2 B for cotton.....		
Metamine blue B G.....		
Fast cotton blue B.....	430.	Dirty violet.
Fast navy blue R M, G M.....		
Naphthol blue B.....		
Nile blue A.....	432.	
Nile blue 2 B.....	433.	Flocks, on excess brownish-yellow sol.
Muscarine.....		
Campanuline.....	434.	Blue-violet ppt.
Indigo:		
Tolylene blue B for cotton.....	477.	Ppt. on large excess.

BLUE:

Indoïne blue R.....	73.	Ppt.
Diamine blue B.....	227.	Ppt.
Diamine blue-black E.....	228.	Ppt.
Noir bleu.....		
Diamine E.....	238.	Ppt.
Brilliant azurine 5 G.....	239.	Ppt.
Direct blue B.....	254.	Ppt.
Sulfon azurine.....	255.	Black-blue ppt.
Benzo black blue G.....	266.	Dark greenish-blue
Benzo black blue 5 G.....	267.	{ ppt. and greenish sol.
Fast wool blue.....	315.	{ Blue ppt. and green sol.
Alpine blue.....		
Methyl alkali blue.....	321.	Ppt.
Alkali blue D.....		
Alkali blue 6 B.....		
Alkali blue.....		
Nicholson blue.....	322.	Ppt.
Fast blue.....		
Ben alcalin.....		
Bavarian blue D S F.....	323.	Darker blue.
Methyl blue water soluble.....		
Methyl blue for silk M L B.....		
Navy blue B.....		
Methyl blue.....		
Methyl blue for cotton.....		
Brilliant cotton blue-greenish.....		
Methyl water blue.....		
Cotton blue.....		
Methyl cotton blue.....		
Bavarian blue D B F.....	324.	{ Little HCl no reaction, on excess ppt.
Helvetia blue.....		
Soluble blue 8 B.....		
Soluble blue 10 B.....		
Diphenylamine blue.....		
X L soluble blue.....		
Bleu methyl.....		
Pure blue B S I.....		

GREEN—Continued.

Night blue.....	336.	{ First ppt., then green, then yellow-brown sol.
Victoria blue 4 R.....	337.	{ First ppt., then green, then yellow-brown sol.
BROWN:		
Victoria blue B.....	334.	{ First ppt., then green, then dark yellow-brown sol.
Victoria blue B alcohol soluble.....	335.	{ Yellow-brown, on dilution green.
New Victoria blue.....	336.	{ First ppt., then green, then yellow-brown sol.
Victoria blue R.....	337.	{ First ppt., then green, then yellow-brown.
Victoria blue 4 R.....	339.	{ Red-brown.
Chrome blue.....	414.	{ To alcoholic sol., red-brown.
Indophenol in powder.....	428.	{ Yellow-brown ppt.
Fluorescent blue.....	431.	{ On excess.
Iris blue.....		
New methylene blue G G.....		
Blen méthylène nouveau N GG.....		

YELLOW:

Cyanol extra.....	291.	{ First green, then yellow.
Acid blue 6 G.....	292.	{ Green, then yellow.
Patent blue V N, superfine, conc.....	293.	{ Green, then yellow.
Ketol blue 4 B N, G R.....		
Cyanine B.....		
Alizarine blue in paste.....		
Alizarine blue R.....		
Alizarine blue G W.....		
Alizarine blue A, D N W.....	392.	{ Red-yellow.
Alizarine blue F, R, R R.....		
Alizarine blue A B.....		

YELLOW—Continued.

Alizarine blue S in powder, also in paste.....	393.	{ More red-yellow.
Anthracene blue S.....		
Alizarine blue.....		
Soluble powder A B S.....		
COLORLESS:		
Coreine A R.....	427.	{ Ppt.
Coreine A B.....	485.	
Cyanin.....		
Chinolin blue.....		
RED:		
Alizarine blue in paste.....		
Alizarine blue R.....		
Alizarine blue G W.....		
Alizarine blue A.....	392.	{ Yellow-red.
Alizarine blue D N W, F, R, R R.....		
Alizarine blue A B.....		
Capri blue G N.....	416.	
Delphin blue.....	417.	{ Turns slightly red-der.
Gallamin blue.....	420.	
Coreine R R.....	421.	{ Fuchsine red.
Celeste blue B.....	423.	{ Ppt. and red sol.
Galleine A.....	426.	
Coreine.....		
NO REACTION:		
Diamine blue 3 R.....	236.	
Diamine pura blue.....		
Benzo pure blue.....	237.	
Congo pure blue.....		
Gentian blue 6 B.....		
Alcohol blue.....		
Alcohol blue S F C.....	303.	{ In alcoholic solution.
Opal blue.....		
Bleu lumière.....		
Hessian blue.....		

VIOLET—Continued.

Patent blue A	294.	On warming.
Fast acid blue R	{ 351.	
Violamine 2 R		
Alizarine blue S in powder	393.	Blue-violet.
Alizarine blue S in paste		
Anthraene blue S		
Alizarine blue		
Soluble powder A B S		
Capri blue G N	416.	Ppt.
Gallamine blue	420.	{ Red-violet, on dilu- tion red flocculent ppt.
Cocine R R	421.	{ Blue-violet, redder on the edges.
Celeste blue B	424.	Blue-violet.
Gallani indigo P		
Gallani indigo P S	432.	{ Turns deeper violet first, then dirty vio- let ppt.
Gentianin		
Methylene blue B, B G		
Methylene blue B R, extra D		
Methylene blue B B in powder extra	440.	{ Deeper violet, on ex- cess dirty violet ppt.
Methylene blue D, B B extra		
Methylene blue B B crystals		
Methylene blue		
Thionine blue G, O extra	442.	On excess ppt.
Thiocarmine R	443.	On warming.
Thiocarmine R en pâte		
Toluidene blue O	444.	Dirty-violet ppt.
Neutral blue	455.	Ppt.
Metaphenylene blue B	469.	Ppt.
Fast blue R and B alcohol soluble		
Induline alcohol soluble		
Azine blue alcohol soluble		
Indigene D, F	474.	{ In alcoholic sol. dirty red or red - violet sol. and dito ppt.
Indophenine extra		
Blue C B alcohol soluble		

VIOLET—Continued.

Printing blue		
Printing blue H		
Printing blue R and B		
Acetine blue	474.	{ In alcoholic sol. dirty red or red - violet sol. and dito ppt.
Nigrine alcohol soluble		
Noir à l'alcool		
Couplers blue		
Bien Coupier à l'alcool		
Noir C N N		
Fast blue R		
Fast blue 3 R		
Bien solide R, 3 R		
Fast blue B		
Fast blue 6 B		
Fast blue greenish		
Solid blue B R & B water soluble	475.	Brown-violet ppt.
Blue C B water soluble		
Induline		
Induline R and B		
Induline 3 B		
Nigrosene water soluble		
Gray R and B		
Bien de Bengale		
Paraphenylene blue R	476.	Ppt.
Fast new blue for cotton		
Para blue	478.	Brown-violet ppt.
BLUE :		
Diamine blue B	227.	Reddish-blue.
Sulfon azurine	254.	After a time blue ppt.
Benzo black-blue G	296.	
Alizarine blue in paste		
Alizarine blue R		
Alizarine blue G W	392.	On excess green.
Alizarine blue A, D N W, F, R, R R		
Alizarine blue A B		
Alizarine indigo blue S in paste	405.	

BLUE—Continued.

BLUE—Continued.

Alizarine cyanine B in paste.....
Alizarine cyanine 2 R, 3 R, R A
extra.....

Alizarine cyanine G in paste.....
Anthracene blue W R.....
Anthracene blue W G.....
Anthracene blue W B.....
Acid alizarine blue B B and G R.....
Brilliant alizarine blue G, R.....
Indazine M.....
Cyanine.....
Chinolin blue.....

Green-blue.

Green-blue.

Violet-blue, on ex-

cess ppt.

Violet-blue, if HCl,

added, violet ppt.

Ppt.

Blue-bronze ppt.,

turns brown on

warming.

GREEN:

Alizarine blue in paste.....
Alizarine blue R.....
Alizarine blue G W.....
Alizarine blue A, D N W, F R, R R.....
Alizarine blue A B.....

On excess.

BROWN:

Methyl alkali blue.....
Alkali blue D.....
Alkali blue 6 B.....
Alkali blue.....
Nicholson blue.....
Fast blue.....
Blen acaolin.....
Bavarian blue D S F.....
Methyl blue water soluble.....
Methyl blue for silk M L B.....
Navy blue B.....

Red-brown.

Red-brown.

Red-brown (cf. red

reaction).

BROWN—Continued.

Methyl blue.....
Methyl blue for cotton.....
Brilliant cotton blue greenish.....
Methyl water blue.....
Cotton blue.....
Methyl cotton blue.....
Bavarian blue D B F.....
Helvetia blue.....
Soluble blue S.....
Soluble blue 10 B.....
Diphenylamine blue.....
XL soluble blue.....
Blen methyl.....
Pure blue B S L.....
Victoria blue B.....
Victoria blue B S alcohol soluble.....
New Victoria blue.....
Victoria blue R.....
Night blue.....
Victoria blue 4 R.....
Phenocyanine.....
New blue R.....
New cotton solid blue.....
Naphthylene blue R in crystals.....
Fast blue R for cotton in crystals.....
Cotton blue R.....
Fast navy blue.....
Fast cotton blue R, R R, 3 R crystals.....
Phenylene blue.....
Blen nouveau P.....
Fast blue III R.....
Fast navy blue R M, M M.....
Naphthol blue R, D.....
Fast blue for cotton.....
Meldolas blue.....

Red-brown.

Dark red-brown ppt.

Flocky ppt.

Pale red-brown ppt.

Violet-brown ppt.

Turning blue on

airing.

Ppt.

429.

BROWN—Continued.

New blue B.....	
New blue G.....	
Fast blue 2 B for cotton.....	
Metamine blue B, G.....	{ Ppt., soluble in ether
Fast cotton blue B.....	{ with brown color.
Fast navy blue R M, G M.....	430.
Naphthol blue B.....	
Muscaxine.....	
Campaniline.....	434.
New methylene blue N.....	Yellow-brown.
Tolylene blue B for cotton.....	Ppt.
	445.
	Ppt.
	477.

ORANGE:

Fri blue.....	287.
	Cloudy yellow-orange.

BLACK:

Alkali blue X G.....	
	{ Violet-black sol. &
	{ ditto ppt. on warm-
	{ ing ppt. becomes
	{ resinous and sol.
	{ colorless.
	327.
New methylene blue G G.....	
Bien methylene nouveau N G G.....	431.
Fulling blue.....	Blue-black ppt.
	471.
	Blue-black.

COLORLESS:

Hoechst: new blue.....	326.
Alkali blue X G.....	327.
	{ On warming sol. be-
	{ comes colorless
	{ with resinous ppt.
Corvène.....	426.
	Ppt.

RED:

Azo blue.....	216.
Diamine blue B X.....	
Benzo blue B X.....	217.
Congo blue B X.....	
Direct blue R.....	223.
	Violet-red.

RED—Continued.

Benzo azurine G.....	
Bengal blue G.....	235.
Cotton blue G.....	
Benzo azurine 8 G.....	236.
	Violet-red.
Diamine pure blue.....	
Benzo pure blue.....	237.
Congo pure blue.....	
Brilliant azurine 5 G.....	238.
Naphthyl blue 2 B.....	237.
Cyanol extra.....	291.
Acid blue 6 G.....	
	{ Fuchsine red; no ppt.
	{ Dicrotic green and
	{ red sol. on warm-
	{ ing bordeaux red.
Gentian blue 6 B.....	
Alcohol blue.....	
Alcohol blue S F C.....	
Opal blue.....	
Bien lumière.....	309.
Hessian blue.....	
Light blue.....	
Blue alcohol soluble.....	
Bien opale.....	
Bavarian Blue D S F.....	
Methyl blue water soluble.....	
Methyl blue for silk M L B.....	323.
Navy blue B.....	
Water blue 6 B extra.....	
Water blue.....	
China blue.....	
Cotton blue 3 B.....	
Bien de Lyons.....	
Silk blue.....	
Blue extra.....	
Cotton blue.....	325.
Water blue B S.....	
Water blue B.....	
Soluble blue.....	
London blue extra.....	
Bien marine.....	
Blackley blue.....	

{ In alcoholic sol.
brown-red.

BLUE—Continued.

RED—Continued.		No REACTION :	
Pure blue	325.	Diamine blue-black E.	238.
Bien soluble pur		Noir bien	
Water blue O		Diamine E.	267.
Soluble blue X G	327.	Benzo black-blue 5 G.	
Gallamine blue	420.	Patent blue V, N, superfine, conc.	292.
		Keton blue 4 B N	
		Keton blue G, R	On boiling violet.
Nile blue A	432.	Cyanine B.	293.
		Patent blue A.	294.
		Fast wool blue	315.
Nile blue 2 B.	433.	Alpine blue	
Fast blue R and B alcohol soluble.		Chrome blue	329.
Solid blue R & B alcohol soluble.		Indophenol in powder.	414.
Induline alcohol soluble.		Fluorescent blue	423.
Azine blue alcohol soluble		Iris blue	
Indigene D, F			Colorless with zinc dust; color returns in air.
Indophenine extra.		Thiocarmine R, R en pâte.	443.
Blue C B alcohol soluble.		Naphthazine blue.	470.
Printing blue.			On heating violet.
Printing blue H.	474.		Slightly duller.
Printing blue R and B.			
Acetine blue.			
Nigrosene alcohol soluble.			
Noir à l'alcool			
Couplers blue			
Bien Coupler à l'alcool			
Noir C N N.			

GREEN.

On H_2SO_4 .

BLACK :		YELLOW :	
Italian green	496. {	Malachite green cryst. or powder....	
	H_2S .	Malachite green B.	
		Benal green	
BROWN :		New Victoria green	284.
Azo green	297.	New green	
Ceruleine in paste.....	{	Solid green crystals	
Ceruleine A in paste.....	367.	Solid green O	
Ceruleine S in powder or in paste....	{	Vert solide cristaux O	
Ceruleine SW in powder or in paste..	368.	Diamond green	
Ceruleine R in paste.....	376.	Diamond green B.	
Gambine R in paste.....	{	Fast green.....	
Gambine G in paste.....	377.	Brilliant green	
Gambine Y in paste.....	{	Malachite green G	
Gambine		Diamond green G	285.
Alace green J		Echyl green.....	
Naphthol green B.....	379.	Smaragd green	
Azine green G B.....	456.	Solid green J	
		Solid green J J O	
VIOLET :		Victoria green 3 B	286.
Benzo olive	262.	New solid green B B & 3 B	
Diamine green B.....	268.	Guinea green B	288.
Wool green S.....	338.	Light green S F bluish	
Fast green M	435.	Acid green	289.
Alizarine green B.....	437.	Acid green M	
Azine green S.....	459.	Acid green bluish	
		Light green S F yellowish.....	
BLUE :		Acid green extra concentré.....	
Acid alizarine green B & G.....	413. {	Acid green	290.
	strong fluorescence.	Acid green D	
		Vert acid J J extra concentré.....	
GREEN :		Methyl green	323.
Diamond green.....	153.	Vert étiocelle.....	
Dioxine.....	{	Double green S F	
Gambine B.....	378.	Light green.....	
Alizarine green G.....	436.		
Methylene green extra yellowish G / conc	441.		

GREEN—Continued.

YELLOW—Continued.		
Ethyl green.....	{ 329.	
Methyl green.....		
ORANGE:		
Chrome green.....	295.	Yellow-orange.
RED:		
Fast green.....		
Fast green extra.....	{ 298.	Yellow-red.
Fast green extra bluish.....		
Alizarine green S.....	391.	{ With development of
		{ Blue or red sol.
Acid Alizarine green B & G.....	413.	{ and strong fluores-
		{ cence.
Gallanyl green.....		
Solid green G.....	{ 425.	Carmoisine red.
GREEN.		
On addition of H₂O to H₂SO₄ Solution.		
BLACK:		
Benzo olive.....	262.	Green-black ppt.
Diamine green B.....	268.	Black ppt.
Ceruleine in paste.....	{ 267.	First reddish-brown,
Ceruleine A in paste.....		{ then greenish sol.,
		{ & green-black ppt.
Ceruleine S in powder or in paste.....	{ 368.	Ppt.
Ceruleine S W in powder or in paste.....		
BROWN:		
Ceruleine in paste.....		
Ceruleine A in paste.....	{ 367.	Reddish-brown, then
		{ greenish sol., and
Gambine R in paste.....	376.	{ green-black ppt.
		{ Yellow sol. and brown
		{ ppt.
BROWN—Continued.		
Gambine G in paste.....		
Gambine Y in paste.....		
Gambine.....	{ 377.	Flocks.
Alsaize green J.....		
Gallanyl green.....	{ 425.	Ppt.
Solid green G.....		
Azine green S.....	{ 459.	First brownish, then
		{ blue-green.
VIOLET:		
Diamond green.....	158.	{ First blue-green sol.,
		{ excess water black-
		{ violet ppt.
Alizarine green G.....	436.	{ First blue, then vio-
		{ let sol., then red
		{ ppt.
BLUE:		
Diamond green.....	158.	{ First green-blue sol.,
		{ excess water black-
		{ violet ppt.
Fast green.....		
Fast green extra.....	{ 298.	Almost colorless, ex-
Fast green extra bluish.....		{ cess water green-
		{ blue.
Alizarine green G.....	436.	{ First blue, then vio-
		{ let sol., then red
		{ ppt.
Methylene green extra yellowish G.....	441.	
GREEN:		
Diamond green.....	158.	{ First green-blue sol.,
		{ excess water black-
		{ violet ppt.

GREEN—Continued.

Malachite green cryst. or powder.....	
Malachite green B.....	
Benzal green.....	
New Victoria green.....	
New green.....	
Solid green cryst.....	284. { First dark-yellow, then yellow-green, excess water green.
Solid green O.....	
Vert solide cristaux O.....	
Diamond green.....	
Diamond green B.....	
Fast green.....	
Brilliant green.....	
Malachite green G.....	
Diamond green G.....	
Æthyl green.....	285. { First red-yellow, then green.
Smaragd green.....	
Solid green J.....	
Solid green J J O.....	
Victoria green 3 B.....	286. { Red-yellow, excess water yellow-green, then yellow-red, then green.
New solid green B B and 3 B.....	
Guinea green B.....	288.
Light green S F bluish.....	
Acid green.....	
Acid green M.....	289. Slowly green.
Acid green bluish.....	
Light green S F yellowish.....	
Acid green extra conc.....	
Acid green.....	290. Slowly green.
Acid green D.....	
Vert acide J J extra concentré.....	
Methyl green.....	
Vert étincelle.....	
Double green S F.....	328. Yellow-green.
Light green.....	
Æthyl green.....	329. { Yellow, excess water green.
Methyl green.....	
Wool green S.....	338. Yellowish-green.

GREEN—Continued.

Cœruleine in paste.....	387. { First reddish-brown, then greenish sol., and green blackppt.
Cœruleine A in paste.....	
Alizarine green S.....	391. { Blue-green ppt. of free chinoline, resp. sulphate.
Alizarine green G.....	436. { First blue, then violet sol., then red ppt.
Alizarine green B.....	437. { First yellow-green sol., then red ppt.
Azine green G B.....	458.
Azine green S.....	459. { First brownish, then blue-green.
COLORLESS:	
Fast green.....	
Fast green extra.....	298. { Almost colorless, excess water green-blue.
Fast green extra bluish.....	
YELLOW:	
Malachite green cryst. or powder.....	
Malachite green B.....	
Benzal green.....	
New Victoria green.....	
New green.....	
Solid green cryst.....	384. { First dark-yellow, then yellow-green, excess water green.
Solid green O.....	
Vert solide cristaux O.....	
Diamond green.....	
Diamond green B.....	
Fast green.....	
Brilliant green.....	
Malachite green G.....	
Diamond green G.....	
Æthyl green.....	285. { First red-yellow, then yellow-green, then green.
Smaragd green.....	
Solid green J.....	
Solid green J J O.....	

GREEN—Continued.

YELLOW—Continued.

Victoria green 3 B.....	286.	{ Red-yellow, excess water yellow-green.
New solid green B B and 3 B.....	288.	{ Yellow-red, then low-green, then green.
Guinea green	288.	
Light green S F bluish	289.	
Acid green	289.	
Acid green M.....	289.	
Acid green bluish.....	289.	
Æthyl green.....	339.	{ Yellow, excess water green.
Methyl green	339.	
Gambine R in paste.....	376.	{ Yellow sol., and brown flocks.
Naphthol green B.....	379.	{ With K_2FeO_4 and K_2FeO_4 sol., gives Fe reaction.
ORANGE : Fast green M	435.	

RED :

Guinea green B.....	288.	{ Yellow-red, then yellow-green, then green.
Azo green.....	297.	{ Reddish flocks.
Dioxine	378.	{ Ppt.
Gambine B.....	413.	
Acid alizarine green B & G	436.	{ Violet-red.
Alizarine green G.....	436.	{ First blue, then violet sol., then red ppt.
Alizarine green B.....	437.	{ First yellow-green sol., then red ppt.
NO REACTION : Chrome green	295.	

GREEN.

On Addition of HCl to Water Solution.

BLACK :		
Diamine green B.....	268.	Blue-black ppt.
Italian green.....	496.	{ Ppt. evaporation of H_2S .
BROWN :		
Light green S F bluish.....	289.	Yellow-brown.
Acid green	289.	
Acid green M.....	289.	
Acid green bluish.....	289.	
Light green S F yellowish.....	290.	Yellow-brown.
Acid green extra conc.....	290.	
Acid green D.....	435.	Conc. HCl, yellow-brown.
Vert acide J J extra conc.....	435.	
Fast green M	435.	
VIOLET :		
Diamond green	158.	{ Dark reddish-violet ppt.
BLUE :		
Acid alizarine green B and G.....	413.	Reddish-blue.
Gallani green	425.	Dark blue ppt.
Solid green G.....	425.	
GREEN :		
Benzo olive.....	262.	Black-green ppt.
Victoria green 3 B.....	286.	{ Yellow-green, then yellow.
New solid green B B and 3 B.....	286.	
Methyl green.....	328.	{ Red-yellow, on dilution yellow-green.
Vert étincelle	328.	
Double green S F	328.	
Light green	328.	

GREEN—Continued.

Ethyl green.....	329. { First green, then yellow. }	Orange : Chrome green.....	295. Yellow-orange.
Methyl green.....	low. }	RED :	
Methylene green extra yellowish G.....	441. Turns greener.	Azo green.....	297. Brown-red.
conc.....		Alizarine green G.....	436. { Bordeaux red sol. and ditto ppt. }
Azine green G B.....	458. Ppt.	Alizarine green B.....	437. { Red crystallized ppt., partially soluble on boiling. }
YELLOW :		NO REACTION :	
Malachite green crystals or powder..		Ceruleine in paste.....	367. }
Malachite green B.....		Ceruleine A in paste.....	367. }
Benzal green.....		Ceruleine S in powder or in paste.....	368. { On warming devel- opes SO ₂ . }
New Victoria green.....		Ceruleine S W in powder or in paste...	376. }
New green.....	284. Red-yellow.	Gambine B in paste.....	376. }
Solid green crystals.....		Gambine G in paste.....	377. }
Solid green O.....		Gambine Y in paste.....	377. }
Vert solide cristaux O.....		Gambine.....	377. }
Diamond green.....		Alsace green J.....	379. }
Diamond green B.....		Naphthol green B.....	459. Almost no reaction.
Fast green.....		Azine green S.....	459. }
Brilliant green.....		GREEN.	
Malachite green G.....		On Addition of NaOH to Water Solution.	
Diamond green G.....	255. Red-yellow.	Browns :	
Ethyl green.....		Beauze olive.....	262. Dark brown.
Smaragd green.....		Violet :	
Solid green J.....		Light green S F bluish.....	289. { Colorless and violet ppt. }
Solid green J J O.....		Acid green.....	289. }
Victoria green 3 B.....	286. { Yellow-green, then yellow. }	Acid green M.....	289. }
New solid green B B and 3 B.....	286. }	Acid green bluish.....	289. }
Guinea green B.....	288. Brown-yellow.	Light green S F yellowish.....	290. { Colorless and turbid violet ppt. }
Fast green.....		Acid green extra conc.....	290. }
Fast green extra.....	298. { Yellow, excess water greenish-yellow. }	Acid green D.....	290. }
Fast green bluish.....	298. }	Vert acide J J extra concentré.....	290. }
Methyl green.....			
Vert écarlate.....	328. { Red-yellow, on dilution green-yellow. }		
Double green S F.....	328. }		
Light green.....			
Ethyl green.....	329. { First green, then yellow. }		
Methyl green.....	low. }		
Wool green S.....	338. Brown-yellow.		

GREEN—Continued.

VIOLET—Continued.

Wool green S.....	338.	{ On warming, then
Alizarine green S in paste.....	404.	{ pink.
Acid alizarine green B and G.....	413.	
Gallani green.....	{ 425.	{ On excess blue-green
Solid green G.....		{ ppt.
Alizarine green G.....	436.	Brown-violet ppt
Methylene green extra yellowish G.....	441.	{ Violet sol. and violet
		{ flocks.

BLUE :
Diamond green.....158. Dark blue.

GREEN :

Brilliant green.....		
Malachite green G.....		
Diamond green.....	285.	{ Decolorized with for-
Æthyl green.....		{ mation of pale
Smaragd green.....		{ green ppt.
Solid green J.....		
Solid green J J O.....		
Guinea green B.....	288.	Blackish-green ppt.
Cœruleine in paste.....		
Cœruleine A in paste.....	367.	{ Dirty green color-
		{ tion.
Cœruleine S in powder or in paste.....		
Cœruleine S W in powder or in paste.....	368.	Olive-green ppt.
Naphthol green B.....	379.	Blue-green.
Gallani green.....		
Solid green G.....	425.	{ Violet, on excess blue-
		{ green ppt.
Alizarine green B.....	437.	Floppy ppt.
Azine green G B.....	458.	Ppt.

COLORLESS :

Malachite green cryst. or powder.....		
Malachite green B.....	284.	Ppt. of color base.
Benzal green.....		

COLORLESS—Continued.

New Victoria green.....		
New green.....		
Solid green cryst.....	284.	Ppt. of color base.
Vert solide cristaux O.....		
Diamond green.....		
Diamond green B.....		
Fast green.....		
Brilliant green.....		
Malachite green G.....		
Diamond green.....	285.	{ With formation of
Æthyl green.....		{ pale green ppt.
Smaragd green.....		
Solid green J.....		
Solid green J J O.....		
Light green S F bluish.....		
Acid green.....	289.	{ Decolorized with tur-
Acid green M.....		{ bid violet ppt.
Acid green bluish.....		
Light green S F yellowish.....		
Acid green extra conc.....		
Acid green.....	290.	{ With turbid violet
Acid green D.....		{ ppt.
Vert acide J J extra conc.....		
Chrome green.....	295.	
Fast green.....		
Fast green extra.....	298.	On warming.
Fast green extra bluish.....		
Methyl green.....		
Vert éteincelle.....	328.	
Double green S F.....		
Light green.....		
Æthyl green.....	329.	
Methyl green.....		

YELLOW :

Diamine green B.....	268.	Turns yellow.
Victoria green 3 B.....	{ 286.	Rad. yellow.
New solid green B B and 3 B.....		
Gambine B in paste.....	376.	Clear yellow sol.
Gambine G in paste.....	{ 377.	{ Green-yellow fluores- cence,
Gambine Y in paste.....		
Gambine.....		
Alsace green J.....	}	

RED :

Wool green S.....	338.	{ On warming violet, then pink.
Alizarine green S.....	391.	Carmine red.
Fast green M.....	435.	Ppt.

NO REACTION :

Azine green S.....	459.	Almost no reaction.
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YELLOW.

On H_2SO_4 .

VIOLET:			BLUE—Continued.	
Sun yellow	10.	Red-violet.	Chromine G.	483. { Yellow, with blue fluorescence.
Metanil yellow			GREEN:	
Orange M N.			Jaune solide N.	90. Blue-green.
Tropaeolin G.	74.		Fast yellow	372. { Green - yellow, with very strong green fluorescence.
Victoria yellow (O double conc.) ..			Alizarine yellow F S.	373. { Red - yellow with green fluorescence.
Jaune G.			Benzoflavine	
Métanil extra.	75.		Benzoflavine No 2.	
Jaune métanile bromé			Leather yellow.	
Curcumeine			Xanthine	
New yellow			Philadelphia yellow G.	
Citronine	80.	Red-violet.	Leather brown	
Jasmine			Phosphine II. N. P.	
Jaune résistante au savon.	115.		Patent phosphine.	
Arnica yellow	118.		Nankin in cake.	
Chrysamine G.	195.	Red-violet.	Rheumine.	374. { Brown with green fluorescence.
Kresotine yellow G.	196.	Red-violet.	Primuline	
Carbazol yellow	200.	Violet-blue.	Carmotine.	
Chrysamine R.	220.	Red-violet.	Polychromine.	
Kresotine yellow R.	222.		Thiochromogene	481. { Pale yellow, with green fluorescence.
Diamine yellow N.	230.		Aureoline.	
Brilliant yellow	250.	Red-violet.	Sulphine.	
Chrysophenine	251.	Red-violet.		
Hessian yellow	252.	Red-violet.	BROWN:	
Diamine gold yellow	255.		Alcohol yellow G.	15.
Mekong yellow G.	270.		Aniline yellow	19. Yellow-brown.
Mekong yellow R.	281.	Blue-violet.	Wool yellow	40. Yellow-brown.
			Narcéine	86.
			Fast yellow	88. Yellow-brown.
			Carbazol yellow	
			Mekong yellow R.	
BLUE:				
Mikado yellow.	13.	Red to blue.		
Jaune solide N.	90.	Blue-green.		
Fast yellow				
Carbazol yellow	200.	Violet-blue.		
Mekong yellow R.	281.	Blue-violet.		

YELLOW—Continued.

Gold yellow.....	89.	
Resorcline yellow.....		
Acid yellow R S.....		
Tropaeoline O.....		
Orange R L, R R L.....		
Jaune II.....		
Diamond yellow B in paste.....	114.	Red-yellow.
Diamond yellow G in paste.....	116.	Reddish-yellow.
Aurine.....	330.	
Yellow coralline.....	330.	
Uranine.....	352.	Slight fluorescence.
Fluoresceine.....		
Chrysoline.....	353.	
Acridine yellow.....	369.	Light yellow.
Benzoflavine.....	372.	Green-yellow, with very strong green fluorescence.
Benzoflavine No. 2.....		
Leather yellow.....		
Xanthine.....		
Phildelphia yellow G.....	273.	Red-yellow, with green fluorescence.
Leather brown.....		
Phosphine II, N. P.....		
Patent phosphine.....		
Naunkin in cake.....		
Alizarine yellow C in paste.....	380.	Light yellow.
Alizarine yellow A in paste.....	381.	
Galloflavine in paste.....	382.	Red-yellow.
Primuline.....		
Carmotone.....		
Polychromine.....	481.	Pale yellow, with greenish fluorescence.
Thiochromogene.....		
Aureoline.....		
Sulphine.....		
Thioflavine S.....	482.	Brown-yellow.
Chromine G.....	483.	Yellow, with blue fluorescence.
Mimosa.....	484.	

BROWN—Continued.

Rheonine.....	374.	Brown, with green fluorescence.
Alizarine yellow in paste.....	383.	Red-brown.
Anthracene yellow in paste.....	384.	Slightly brownish.
COLORLESS:		
Auramine.....		
Auramine I, O, II, conc.....	252.	
Fuchsine scarlet.....		
Safranin scarlet.....		
Auramine G.....	283.	
Thioflavine T.....	479.	
YELLOW:		
Aurantia.....	2.	Pale yellow.
Kaiser yellow.....		
Picric acid.....	3.	
Tartrazine.....	7.	
Nitrophenine.....	8.	Gold-yellow.
Thiazol yellow.....		
Clayton yellow.....	9.	Brownish-yellow.
Prague alizarine yellow G.....	28.	
Alizarine yellow R.....		
Orange R.....	34.	Orange-yellow.
Terra octa R.....		
Alizarine yellow R W powder.....		
Prague alizarine yellow R.....	35.	Orange-yellow.
Persian yellow.....	45.	Orange yellow.
Phenoflavine.....	76.	
Fast yellow.....		
Fast yellow G. S.....		
Fast yellow greenish.....		
Acid yellow.....		
New yellow L.....		
Acme yellow.....		
Chrysoline.....	83.	Brown-yellow.
Yellow T.....		

YELLOW—Continued.

ORANGE :		
Mikado gold yellow 2 G, 4 G, 6 G, 8 G.	5.	Red to orange.
Direct yellow 2 G, 3 G.		
Alizarine yellow G G.	27.	
Alizarine yellow G G W powder.		
RED :		
Mikado gold-yellow 2 G, 4 G, 6 G, 8 G.	5.	Red to orange.
Direct yellow 2 G, 3 G.		
Curcume S.	10.	
Sun yellow.		
Direct yellow G.	11.	Pure cherry-red.
Jaune direct.		
Mikado yellow.	13.	Red to blue.
Diamond flavine G.	71.	Dark blood-red.
BLACK :		
Azo yellow.		
Azo yellow M.		
Azo acid yellow.		
Indian yellow.	81.	Fuchsine red.
Indian yellow G.		
Jaune brillant.		
Helanthine.		
Citronine.		
Brilliant yellow S.		
Brilliant yellow.	82.	Blue-red.
Yellow W R.		
Curcume.		
WHITE :		
Chrome yellow D.		
Anthracene yellow B N.	107.	Orange-red.
Mordant yellow.		
Mordant yellow O.		
Fulling yellow.		
Hessian yellow.	252.	Ppt.
Nekong yellow R.	281.	Black-brown ppt.
VIOLET :		
Cotton yellow G.	168.	Blue-violet ppt.
Kresotine yellow G.	196.	Blue-violet ppt., then greenish-yellow ppt.
Brilliant yellow.	250.	Ppt.

YELLOW.

On addition of H₂O to H₂SO₄ solution.

BLACK :		
Chrome yellow D.		
Anthracene yellow B N.	107.	Flocky reddish-gray ppt.
Mordant yellow.		
Mordant yellow O.		
Fulling yellow.		
Hessian yellow.	252.	Ppt.
Nekong yellow R.	281.	Black-brown ppt.
WHITE :		
Alizarine yellow A in paste.	381.	Ppt.
Galloflavine in paste.	382.	Gray-white ppt.
VIOLET :		
Cotton yellow G.	168.	Blue-violet ppt.
Kresotine yellow G.	196.	Blue-violet ppt., then greenish-yellow ppt.
Brilliant yellow.	250.	Ppt.

BROWN—Continued.	
Rheumine.....	{ Brownish-red sol. with orange-red fluorescence. } 374.
Chloramine yellow.....	{ } 480.
Oxyphenine.....	{ Ochre-brown ppt. } 480.
Thiophenine gold.....	{ } 480.
Thiophosphine J.....	{ } 480.
Chlorophenine G.....	{ } 480.
Chromine G.....	{ } 483.
Chromine G.....	{ } 483.
YELLOW:	
Aurania.....	{ } 2. Ppt.
Kaiser yellow.....	{ } 2. Ppt.
Picric acid.....	{ } 3. Light yellow.
Mikado gold yellow 2 G, 4 G, 6 G, 8 G.....	{ } 5.
Direct yellow 2 G, 3 G.....	{ } 5.
Tartrazine.....	{ } 7. Ppt.
Nitrophenine.....	{ } 8. Ppt.
Thiazol yellow.....	{ } 9. Turnslighter, no ppt.
Clayton yellow.....	{ } 9. Turnslighter, no ppt.
Curcumine S.....	{ } 10. Brown-yellow ppt.
Sun yellow.....	{ } 11.
Direct yellow G.....	{ } 11.
Alizarine yellow G.....	{ } 27. Light yellow ppt.
Alizarine yellow G W powder.....	{ } 27. Light yellow ppt.
Prague alizarine yellow G.....	{ } 28. Ppt.
Alizarine yellow R.....	{ } 34. Brownish-yellow ppt.
Orange R.....	{ } 34. Brownish-yellow ppt.
Terra cotta R.....	{ } 34. Brownish-yellow ppt.
Alizarine yellow R W powder.....	{ } 34. Brownish-yellow ppt.
Prague alizarine yellow R.....	{ } 35. Orange-yellow ppt.
Persian yellow.....	{ } 45. Brownish-yellow ppt.
BROWN:	
Jaune solide N.....	{ } 90. Steel-blue ppt.
Fast yellow.....	{ } 90. Steel-blue ppt.
Kresotine yellow R.....	{ } 222. { First blue ppt., then green, then yellow ppt. } 222.
Chrysophenine.....	{ } 251. Ppt.
GREEN:	
Kresotine yellow R.....	{ } 222. { Blue ppt., turns then green, finally yellow. } 222.
Diamine yellow N.....	{ } 230. Greenish-brown ppt.
Diamine gold yellow.....	{ } 255. { First green floccs, later brown floccs. } 255.
BROWN:	
Mikado yellow.....	{ } 13. Brownish ppt.
Diamond faviine G.....	{ } 71. Yellow-brown ppt.
Curcumine.....	{ } 80. Olive-brown.
New yellow.....	{ } 80. Olive-brown.
Citronine.....	{ } 80. Olive-brown.
Jasmine.....	{ } 80. Olive-brown.
Azo yellow.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Azo yellow M.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Azo faviine.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Azo acid yellow.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Indian yellow.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Jaune brillant.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Helianthine.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Citronine.....	{ } 81. { Yellow-red, later yellow-brown ppt. } 81.
Narceline.....	{ } 86. { Yellow-brown, on warming escapes SO ₂ . } 86.
Holgroand yellow.....	{ } 170. Ppt.
Chrysamine G.....	{ } 195. Ppt.
Carbazol yellow.....	{ } 200. Ppt.
Chrysamine R.....	{ } 220. Floccs.
Mekong yellow G.....	{ } 273. Ppt.
Mekong yellow R.....	{ } 281. Black-brown ppt.

YELLOW—Continued.

YELLOW—Continued.		YELLOW—Continued.	
Fast yellow.....		Uranine.....	
Fast yellow G.....		Fluoresceine.....	352. { Yellow sol. with
Fast yellow S.....		Chrysoline.....	353. { slight fluorescence.
Acid yellow.....		Acridine yellow.....	369. Ppt.
New yellow L.....		Benzo flavine.....	372. { Yellowish sol., then
Azo yellow M.....		Benzo flavine No. 2.....	orange ppt.
Azo yellow.....		Leather yellow.....	
Azo acid yellow.....		Xanthine.....	
Indian yellow.....		Philadelphia yellow G.....	
Indian yellow G.....		Leather brown.....	373. Red-yellow.
Jaune brillant.....		Phosphine II, N. P.....	
Hellanthine.....		Patent phosphine.....	
Citronine.....		Naunkin in cake.....	
Acme yellow.....		Flavinduline.....	447. Turns yellow.
Chrysoine.....		Thioflavine T.....	479.
Chrysoline.....		Primuline.....	
Yellow T.....		Carotone.....	
Gold yellow.....		Polychromine.....	481. Ppt.
Resorchine yellow.....		Thiochromogene.....	
Acid yellow R S.....		Aureoline.....	
Tropaeoline O.....		Sulphine.....	
Orange R I, R L.....		Thio flavine S.....	482. Orange-yellow ppt.
Jaune II.....		Chinoline yellow alcohol soluble.....	487. Flocky ppt.
Ortol yellow.....		Chinoline yellow.....	488.
Cotton yellow R.....		Jaune de quinoline soluble.....	
Alkali yellow.....		RED:	
Diamond yellow B in paste.....	113. Brown-yellow ppt.	Alcohol yellow G.....	15.
Diamond yellow.....		Aniline yellow.....	
Diamond yellow G in paste.....	114. Brownish-yellow ppt.	Alcohol yellow R.....	40. { Reddish sol., then
	116. { Yellow gelatinous ppt.	Metanil yellow.....	reddish ppt. *
		Orange M N.....	
Auramine.....		Tropaeoline G.....	
Auramine O, I, II, conc.....	252. Pale yellow.	Victoria yellow (O double conc.).....	74. Fuchsine red.
Fuchsine scarlet.....		Jaune G.....	
Safranine scarlet.....		Metanil extra.....	
Auramine G.....	253. Light yellow.		
Yellow coralline.....	330. { Yellow sol. and dito ppt.		

RED—Continued.

Azo yellow	
Azo yellow M.	
Azo fufine.	
Azo acid yellow.	
Indian yellow.	81. { Yellow-red sol., then
Indian yellow G.	yellow-brown ppt.
Jaune brillant.	
Helianthine.	
Citronine.	
Brilliant yellow S.	
Brilliant yellow.	82. Fuchsin red.
Yellow W R.	
Curcumine.	
Fast yellow.	
Fast yellow R.	88. Fuchsin red.
Yellow W.	
Cumprussal yellow.	108. Orange-red.
Jaune resistant au savon.	
Yellow fast to soap.	115. Fuchsin red.
Rhoneine.	374. { Brownish-red sol.
	with orange-red
	fluorescence.

YELLOW.

On addition of HCl to Water Solution.

BLACK:

Chrome yellow D.	
Anthracene yellow B N.	
Mordant yellow.	107. Gray gelatinous ppt.
Mordant yellow O.	
Fulling yellow.	
Arnica yellow.	118. Brown-black ppt.
Essian yellow.	252. Ppt.

VIOLET:

Jaune métanile bromé.	75. Ppt.
Fast yellow.	
Fast yellow G.	
Fast yellow greenish.	
Fast yellow S.	77. { Flesh-colored gelati-
Acid yellow.	nous ppt, and red-
New yellow, L.	dish-violet water
Jaune resistant au savon.	soluble crystals.
Yellow fast to soap.	
Brilliant yellow.	115. Red-violet.
	250. Ppt.
BLUE:	
Jaune solide N.	
Fast yellow.	90. Steel-blue ppt.
GREEN:	
Diamine yellow N.	230. Greenish ppt.
BROWN:	
Mikado gold yellow 2 G, 4 G, 6 G, 8 G.	
Direct yellow 2 G, 3 G.	5. Brownish to yellow.
Direct yellow G.	11. Brown, later ditto ppt.
Mikado yellow.	13. Brownish ppt.
Azo yellow.	
Azo yellow M.	
Azo fufine.	
Azo acid yellow.	
Indian yellow.	
Indian yellow G.	
Jaune brillant.	81. { Brownish, on excess
Helianthine.	deeper brown.
Citronine.	
Cotton yellow G.	168. Ppt.
Heligoland yellow.	170. Ppt.
Chrysamine G.	195. Ppt.
Carbazol yellow.	200. Ppt.
Chrysamine R.	220. Flocks.
Chrysophenine.	251. Ppt.
Diamine gold yellow.	255. Flocks.

YELLOW—Continued.

BROWN—Continued.		
Mekong yellow G.....	279. Ppt.	
Mekong yellow R.....	281. Dark-brown ppt.	
Chromine G.....	483. Brownish flocks.	
COLORLESS:		
Martius yellow.....		
Naphthylamine yellow.....		
Golden yellow.....		
Manchester yellow.....		
Naphthaline yellow.....		
Naphthol yellow.....		
Aurotine.....	332. { Precipitation of tetra- nitro-phenolphtha- lene.	
ORANGE:		
Phenoflavine.....	76.	
Benzoflavine.....		
Benzotriazine No. 2.....	272. Ppt.	
Rheonine.....	374. { Brownish-red with orange-red fluores- cence.	
YELLOW:		
Aurantia.....		
Kaiser yellow.....	2. Light yellow.	
Mikado gold yellow 2 G, 4 G, 6 G, 8 G.....		
Direct yellow 2 G, 3 G.....	5. Brownish to yellow.	
Naphthol yellow S.....		
Citronine A.....		
Sulphur yellow S.....		
Jaune acide.....	6. Turns lighter; no ppt.	
Jaune acide C.....		
Nitrophenine.....	8. Ppt.	
Thiazol yellow.....		
Clayton yellow.....	9. Red-yellow ppt.	
Curcume S.....		
Sun yellow.....	10. Brown-yellow ppt.	
YELLOW—Continued.		
Prague alizarine yellow G.....	28. Ppt.	
Prague alizarine yellow R.....	35. Orange-yellow ppt.	
Oriol yellow.....		
Cotton yellow R.....	113. Ppt.	
Alkali yellow.....		
Alkali yellow R.....	120. Brown-yellow ppt.	
Kresotine yellow G.....	196. { Brownish-yellow flocks.	
Kresotine yellow R.....	222. { Brownish-yellow flocks.	
Auramine.....		
Auramine O, I, II, conc.....	282. { Dark-yellow, decom- poses on boiling.	
Fuchsine scarlet.....		
Safranine scarlet.....		
Yellow coralline.....	330. { Yellow sol., and brown-yellow flocks.	
Uranine.....	362. Flocks.	
Fluoresceine.....		
Chrysoline.....	363. Brown-yellow ppt.	
Acridine yellow.....	369. Ppt.	
Chloramine yellow.....		
Oxyptenne.....		
Oxyptenne gold.....	480. Orange-yellow ppt.	
Thiaphosphine J.....		
Chlorophenine G.....		
Primuline.....		
Carmotone.....		
Polychromine.....	481. Ppt.	
Thiochromogene.....		
Antreoline.....		
Sulphine.....		
Thioflavine S.....	482. Orange-yellow ppt.	
Mimosa.....	484. Orange-yellow ppt.	
Chinoline yellow.....		
Jaune de quinoline soluble.....	488. Turns lighter.	

RED :

Alcohol yellow R.....	40.	Red crystals.
Metanil yellow.....		
Orange M N.....		
Tropaeolin G.....		
Victoria yellow (O double conc).....	74.	Fuchsine-red and ppt.
Juane G.....		
Metanil extra.....		
Fast yellow.....		
Fast yellow G. S.....		
Fast yellow greenish.....		
Acid yellow.....	77.	{ Flesh-colored gelatinous ppt. and reddish violet water soluble crystals.
New yellow L.....		
Curcumæne.....		
New yellow.....		
Citronine.....	80.	Fuchsine-red.
Jasmine.....		
Brilliant yellow S.....		
Brilliant yellow.....		
Yellow W R.....	82.	Violet-red.
Curcumine.....		
Fast yellow.....		
Fast yellow R.....	88.	Fuchsine red.
Yellow W.....		
Crumpall yellow.....	108.	Orange-red.
Rheonine.....	374.	{ Brownish-red, with green fluorescence.

NO REACTION :

Picric acid.....	3.	
Tatrazine.....	7.	
Diamond flavine G.....	71.	
Acme yellow.....		
Chrysoline.....		
Chrysochine.....		
Yellow T.....		
Gold yellow.....	83.	
Resorcin yellow.....		
Acid yellow R S.....		

NO REACTION—Continued.

Trapezoline O.....		
Orange R L.....		
Orange R R L.....	88.	
Juane II.....		
Narcæine.....	86.	
Auramine G.....	283.	Bleached by boiling. (In alcoholic sol.)
Aurine.....	380.	
Alizarine yellow A in paste.....	381.	
Gallodavine in paste.....	382.	(Almost no reaction, turns slightly lighter.
Flavinduline.....	447.	
Thiodavine T.....	473.	

YELLOW.

On Addition of NaOH to Water Solution.

WHITE :

Auramine.....		
Auramine O. I. II.....		{ Ppt., soluble in ether; this solution with $C_2H_4O_2$ turns yellowish.
Auramine conc.....	282.	
Fuchsine scarlet.....		
Safranine scarlet.....		
Auramine G.....	283.	{ Flocky ppt., soluble in ether; this sol. with $C_2H_4O_2$ turns yellow.
Benzodavine.....		
Benzodavine No. 2.....	372.	Yellowish-white ppt.

VIOLET :

Nitrophenine.....	8.	
Pragte alizarine yellow R.....	35.	Blue-violet.

GREEN :

Uranine.....		
Fluoresceine.....	352.	{ Yellow sol., turns darker with green fluorescence.

YELLOW—Continued.

GREEN—Continued.

Alizarine yellow A in paste..... 381. } Deep yellow sol., turns green rapidly.

BROWN :

Wood yellow..... 19. Yellow-brown.
Persian yellow..... 45. Orange-brown.

Curcumin..... 80. Yellow-brown.
New yellow.....
Citronine.....
Jasmine.....

Azo yellow.....
Azo yellow M.....
Azo flavine.....
Azo acid yellow.....
Indian yellow.....
Indian yellow G.....
Jaune brilliant.....
Helianthine.....
Citronine.....

Acme yellow.....
Chrysoline.....
Chrysochrome.....
Yellow T.....
Gold yellow.....
Resorcine yellow.....
Acid yellow R S.....
Tropaeoline O.....
Jaune II.....
Orange R L.....
Orange R R L.....

Arnica yellow..... 118. Red-brown.
Chrysamine G..... 195. Red-brown.
Chrysamine R..... 220. Red-brown.
Mekong yellow G..... 279. Red-brown.
Chrysoline..... 353. Turns darker.
Rheomine..... 374. Light brown ppt.

BROWN—Continued.

Alizarine yellow C in paste..... 380. } Brownish, turns darker on exposure to air.
Galloflavine in paste..... 382. Yellow-brown.

ORANGE :

Mikado yellow..... 13. } Yellow to red-orange ppt.
Prague alizarine yellow G..... 28. Dark red-orange.
Diamond flavine G..... 71. Deeper orange.
Phenoflavine..... 76. Yellow sol. and orange flocks.
Cotton yellow G..... 168. Red-orange ppt.
Kresoline yellow E..... 222. 251. }
Chrysophenine..... 454. }
Mimosa.....

YELLOW :

Auramine..... 2. Deep orange-yellow.
Kaiser yellow..... 3. Dark yellow.
Picric acid..... 5. Ppt.
Mikado gold yellow 2 G, 4 G, 6 G, 8 G.....
Direct yellow 2 G, 3 G.....
Naphthol yellow S.....
Citronine A.....
Sulphur yellow S.....
Jaune acide.....
Thiazol yellow.....
Clayton yellow.....
Curcumin S.....
Sun yellow.....
Direct yellow G.....
Jaune direct.....
Alizarine yellow G G.....
Alizarine yellow G G W powder.....

6. } Orange-yellow floccy ppt.

9. } Red-yellow sol. and ditto ppt.

10. Red-yellow ppt.

11. Ppt.

27. Orange-yellow.

YELLOW—Continued.	
Jaune métanile bromé.....	75.
Grunpsall yellow.....	108.
Carbazol yellow.....	200.
Diamine yellow N.....	230.
Chrysopienne.....	231. { Yellow sol., and orange floccs.
Diamine gold yellow.....	255.
Alizarine yellow F S.....	272.
Uranine.....	352. { Turns darker with dark-green fluores- cence.
Fluoresceine.....	359.
Acridine yellow.....	Ppt.
Leather yellow.....	
Xanthine.....	
Phthalophia yellow G.....	
Leathet brown.....	373.
Phosphine II, N, F.....	
Fatent phosphine.....	
Naunkin in cake.....	
Alizarine yellow A in paste.....	381. { Deep yellow, turning rapidly green on ex- posure to air.
Alizarine yellow in paste.....	383.
Anthrascene yellow in paste.....	384.
Flavinduline.....	447. { Yellowish ppt., sol- ble in ether without fluorescence.
Chloramine yellow.....	
Oxyphenine.....	
Oxyphenine gold.....	480.
Thiophosphine J.....	
Chlorophenine G.....	
Chromine G.....	483.
Chinoline yellow.....	
Jaune de quinoléne soluble.....	488. { Turns darker.

RED:	
Tartazine.....	7. Turns redder.
Alizarine yellow R.....	
Orange R.....	34. Blood-red.
Terra cotia R.....	
Alizarine yellow R W powder.....	
Brilliant yellow S.....	82. { Little NaOH no re- action, on excess violet-red.
Brilliant yellow.....	
Yellow W R.....	
Curcumine.....	86. Brown-red.
Narceine.....	
Chrome yellow D.....	
Anthrascene yellow B N.....	
Mordant yellow.....	107. Orange-red ppt.
Mordant yellow O.....	
Fulling yellow.....	
Ortol yellow.....	113. Turns redder.
Cotton yellow R.....	
Alkali yellow.....	
Alkali yellow R.....	120. Orange-red ppt.
Helgoland yellow.....	170. Turns redder.
Kresotine yellow G.....	196. Yellow-red.
Brilliant yellow.....	250. Yellow-red.
Hessian yellow.....	252. Cherry-red.
Mekong yellow R.....	281. Turns redder.
Aurine.....	330. { Alcoholic sol. cherry- red.
NO REACTION:	
Métanil yellow.....	
Orange m N.....	74. {
Tropaeoline G.....	
Victoria yellow (O double conc.).....	
Métanil extra.....	

YELLOW—Continued.

No Reaction—Continued.		No Reaction—Continued.	
Fast yellow	77.	Jaune resistant au savon.	115.
Fast yellow G, S.		Yellow fast to soap.	
Fast yellow greenish.		Yellow coralline	
Acid yellow		Aurofine	
New yellow L.		Thioflavine T.	
Brilliant yellow S	82.	Primuline	481.
Brilliant yellow		Carboline	
Yellow W R.		Polychromine	
Curcumine		Thiochromogene	
Fast yellow	88.	Aureoline	482.
Fast yellow R.		Sulphine	
Yellow W		Thioflavine S.	

{ Little NaOH no re-
action, on excess
violet-red.

ORANGE.

On H_2SO_4 .

BLACK :					
Tolylene orange R R	.....	242.	Blue-gray.		
BROWN :					
Helanthine	.....			
Orange III.	.....			
Orange No. 3.	.....	78.			
Dimethylaniline orange	.....			
Methyl orange	.....			
Tropæoline D	.....			
Gold orange	.....			
Tolylene orange R.	.....	201.			
Kanthesine R.	.....			
Alizarine orange A in paste.	.....			
Alizarine O R.	.....			
Alizarine O G.	.....			
Alizarine orange	.....			
Alizarine orange N	.....			
Alizarine orange A O.	.....	389.	Yellow-brown.		
Alizarine orange powder.	.....			
Alizarine orange A O P.	.....			
Alizarine brown.	.....			
VIOLET :					
Orange IV	.....			
Orange N, G S.	.....			
New yellow	.....			
Acid yellow D.	.....			
Tropæoline O O	.....	79.			
Fast yellow	.....			
Diphenyl orange	.....			
Diphenylamine orange.	.....			
Jaune d'aniline.	.....			
Chicago orange	.....	117.			
Benzo orange R.	.....	190.	Violet-blue.		
Cloth orange	.....	192.	Red-violet.		
BLUE :					
Direct orange 2 R.	.....	12.			
Mikado orange G, R, 2 R, 3 R, 4 R, 5 R.	.....	13.	Changes from red to blue.		
Benzo orange R.	.....	190.	Violet-blue.		
Congo orange R.	.....	215.	Dark blue.		
Azo orange R.	.....	280.			
COLORLESS :					
Acridine orange	.....	370.	Greenish fluorescence.		
Acridine scarlet R, 2 R, 3 R.	.....	370.	cence.		
ORANGE :					
Cotton orange G.	.....	111.	Brown-orange.		
Alizarine orange G.	.....	400.	Orange-red.		
YELLOW :					
Cerotine orange C extra.	.....			
Gold orange for cotton.	.....	17.	Green-yellow.		
Chrysoidine R.	.....			
Ponceau 4 G B.	.....			
Croceïne orange.	.....			
Brilliant orange G.	.....	22.	Orange-yellow.		
Orange G R X.	.....			
Pyrotine orange.	.....			
Orange E N L.	.....			
Orange G	.....			
Orange G	.....			
Orangé G en cristall.	.....	24.	Orange-yellow.		
Patent orange.	.....			
Orange III (No. 3).	.....	26.	Orange-yellow.		
Pyramine orange.	.....	253.			
Acridine orange R extra	.....	371.	Green fluorescence.		

ORANGE—Continued.

RED:		ORANGE.	
		On addition of H_2O to H_2SO_4 solution.	
RED:	Mikado orange G, R. 2 R, 3 R, 4 R, 5 R.....	13. { Changes from red to yellow.	BLACK:
	Ponceau 2 G.....		
	Brilliant ponceau G G.....	23. Cherry-red.	Azo orange R.....280. Dark gray ppt.
	Ponceau J.....		
	Orange.....	43. {	BROWN:
	Orange G T, R N.....		
	Brilliant orange O.....	84. Violet-red.	Mikado orange G, R. 2 R, 3 R, 4 R, 5 R.. 13. Brownish ppt.
	Orange N.....		
	Orange I.....	85. {	22. Yellow-brown ppt
	Naphthol orange.....		
	α -Naphthol orange.....	89. {	43. Brown oily drops.
	Tropaeoline O O No. 1.....		
	Orange II.....	91. {	84. Red-brown.
	Orange P.....		
	Orange extra.....	162. {	89. Yellow-brown flocks.
	Orange A, G.....		
	Acid orange.....	221. {	91. Ppt.
	Atlas orange.....		
	Gold orange.....	400. {	117. 1 ppt.
	Mauderine G extra.....		
	β -Naphthol orange.....		192. Ppt.
	Tropaeoline O O No. 2.....		
	Orange T.....	89. {	215. Dark brown ppt.
	Orange R.....		
	Kermesine orange.....	91. {	221. Brownish ppt.
	Orange R.....		
	Cotton orange R.....	162. {	VIOLET:
	Tolylene orange G.....		
	Kanthosine J.....	221. {	Orange IV.....
	Alizarine orange G.....		
		400. {	Orange N, G S.....
			New yellow.
			Acid yellow D.....

VIOLET—Continued.

Tropaeoline O O.....	
Fast yellow.....	79. Ppt.
Diphenyl orange.....	
Diphenylamine Orange.....	
Jaune d'aniline.....	
Benzo orange R.....	190. Gray-violet ppt.

ORANGE:

Direct orange 2 R.....	12.
Orange III (No. 3).....	26. { First orange-yellow ppt., then yellow sol.
Acridine orange.....	370. { First red, then or- ange.
Acridine scarlet R, 2 R, 3 R.....	400. Light orange-yellow.

YELLOW:

Ponceau 2 G.....	23. Red yellow.
Brilliant ponceau.....	
Ponceau J.....	26. { First orange-yellow ppt., then yellow sol.

Orange II.....	
Orange P.....	
Orange extra.....	
Orange A, G.....	85. Brown-yellow ppt.
Atlas orange.....	
Gold orange.....	
Mandarin G extra.....	
β -Naphthol orange.....	
Tropaeoline O O No. 2.....	371.
Acridine orange B extra.....	

Alizarine orange A in paste.....	
Alizarine O R, O G.....	389. Light yellow ppt
Alizarine orange.....	
Alizarine orange N, A O.....	
Alizarine orange powder.....	

YELLOW—Continued.

Alizarine orange A O P.....	{ 389. Light yellow ppt.
Alizarine brown.....	
Alizarine orange G.....	400. Light orange-yellow.

RED:

Cerotine Orange C extra.....	{ 17. { Red, with more water Gold orange for cotton yellow-red.
Chrysoidine R.....	
Helianthin.....	
Orange III.....	78. Fuchsine red.
Dimethylaniline orange.....	
Methyl orange.....	
Tropaeoline D.....	
Gold orange.....	111. Reddish ppt.
Cotton orange G.....	162. Reddish ppt.
Cotton orange R.....	201. Reddish ppt.
Tolylene orange R.....	253. Yellow-red ppt.
Kanthosine R.....	{ 370. { First red, then orange.
Pyramine orange.....	
Acridine orange.....	
Acridine scarlet R, 2 R, 3 R.....	

No REACTION:

Orange G.....	{ 24.
Orange G G.....	
Orange G G en cristaux.....	
Patent orange.....	

ORANGE.

On Addition of HCl to Water Solution.

BLACK:	
Azo orange R.....	280. Dark gray ppt.
BROWN:	
Mikado orange G, R, 2 R, 3 R, 4 R, 5 R.....	13. Brownish ppt.

ORANGE—Continued.

BROWNS—Continued.		VIOLET—Continued.	
Ponceau 4 G D.		Fast yellow	
Croceine orange		Diphenyl orange	13. Brownish ppt.
Brilliant orange G		Diphenylamine orange	
Orange G R X.	22. Yellow-brown ppt.	Jasne d'aniline	190. Red-violet.
Pyrodine orange.		Benzo orange R.	
Orange K N L.			
Orange		GREEN:	
Orange G T. R N.	43. Oily drops.	Direct orange 2 R.	12. Turbid olive-green ppt.
Brilliant orange O.		YELLOW:	
Orange N.		Orange III (No. 3).	26. { Orange-yellow ppt., soluble in large amount of water.
Orange I.		Orange II	
Naphthol orange	84. Ppt.	Orange P.	
α -Naphthol orange		Orange extra	
Tropaeoline O O No. 1.		Orange A. G.	
Orange II.		Acid orange	
Orange P, extra.		Atlas orange	
Orange A. G.		Gold orange	85. Brown-yellow ppt.
Acid orange.		Mandarin G extra.	
Atlas orange	85. Brown-yellow ppt.	β -Naphthol orange	
Gold orange		Tropaeoline O O No. 2.	
Mandarin G extra.		Alizarine orange G.	400. Turns lighter.
β -Naphthol orange		ORANGE:	
Tropaeolin O O No. 2		Orange III, (No. 3)	{ Orange-yellow ppt., soluble in large amount of water.
Orange T.			
Orange R.	89. Yellow-brown flocks.		
Kermesin orange.		RED:	
Chicago orange.	117. Flocks.	Caroline orange G extra.	
Cloth orange	192. Ppt.	Gold orange for cotton	17.
Toluylene orange G.		Chrysoidine R.	
Kanthosine J.	221. Yellow-brown flocks.	Helianthine	
		Orange III.	
		Dimethyl aniline orange.	
		Methyl orange	78. Fuchsine red
		Tropaeoline D.	
		Gold orange	

VIOLET:

Orange IV	
Orange N, G S.	
New yellow	79. Ppt.
Acid yellow D.	
Tropaeoline O O	

RED—Continued.

Orange R.....	91.	Brown-red ppt.
Cotton orange G.....	111.	Reddish ppt.
Cotton orange R.....	162.	Reddish ppt.
Toluylene orange R.....	{ 201.	Blinish-red flocks.
Kanthosine R.....	242.	Brown-red ppt.
Toluylene orange R R.....	253.	Yellow-red ppt.
Pyramine orange.....	370.	
Acridine orange.....	{ 371.	
Acridine scarlet R, 2 R, 3 R.....		
Acridine orange R extr.....		
Alizarine orange A in paste.....		
Alizarine O R.....		
Alizarine O G.....		
Alizarine orange.....		
Alizarine orange N.....	{ 389.	{ With Soda, fuchsine
Alizarine orange A O.....		{ red.
Alizarine orange powder.....		
Alizarine orange A O P.....		
Alizarine brown.....		

NO REACTION :

Ponceau 2 G.....		
Brilliant ponceau G G.....		
Ponceau J.....	{ 23.	Almost no reaction.
Orange G.....		
Orange G G.....		
Orangé G en cristaux.....	{ 24.	
Patent orange.....		

ORANGE.

On Addition of NaOH to Water Solution.

Brown :		
Orange III (No. 8).....	26.	Yellow-brown.
Orange.....		
Orange G T, R N.....		
Brilliant orange O.....	{ 43.	Dark brown-red.
Orange N.....		

BROWN—Continued.

Orange II.....		
Orange P.....		
Orange extra.....		
Orange A, G.....		
Acid orange.....		
Atlas orange.....	85.	Dark brown.
Gold orange.....		
Mandarine G extra.....		
β -Naphthol orange.....		
Tropaeoline O O No. 2.....		
Orange T.....		
Orange R.....	89.	Red-brown.
Kermesine orange.....		
Chicago orange.....	117.	Orange-brown ppt.
YELLOW :		
Mikado orange G, R, 2 R, 3 R, 4 R, 5 R.....	13.	{ Yellow- to red-orange ppt.
Cerotine orange C extra.....		
Gold orange for cotton.....	17.	Ppt. of base.
Chrysoidine R.....		
Ponceau 4 G B.....		
Croceine orange.....		
Brilliant orange.....		
Orange G R X.....	22.	Brown-yellow.
Pyrotine orange.....		
Orange E N L.....		
Ponceau 2 G.....		
Brilliant ponceau G G.....	23.	Turns yellower.
Ponceau J J.....		
Helianthine.....		
Orange III.....		
Dimethylaniline orange.....		
Methyl orange.....	78.	{ Orange - yellow ppt., soluble in large amount of water.
Tropaeoline D.....		
Gold orange.....		
Orange R.....	91.	Brown-yellow.
Benzo orange R.....	190.	{ In conc. sol. red-yel- low ppt.

ORANGE—Continued.

YELLOW—Continued.		
Tolylene orange G.....	221. {	Reddish orange-yellow.
Kanthosine J.....	low.	
Acridine orange.....	370. {	Ppt.
Acridine scarlet R, 2 R, 3 R.....	371. {	Ppt.
Acridine orange R extra.....	371. {	Ppt.
ORANGE:		
Direct orange 2 R.....	12. {	Yellow-orange ppt.
Mikado orange G, R, 2 R, 3 R, 4 R.....	13. {	Yellow-to red-orange ppt.
5 R.....		
RED:		
Orange G.....	24. {	Yellow-red.
Orange G G.....		
Orangé G G en cristaux.....		
Patent orange.....		
Orange.....		
Orange G T.....		
Orange R N.....	43. {	Dark brown-red.
Brilliant orange O.....		
Orange N.....		
Orange IV.....		
Orange N.....		
Orange G S.....		
New yellow.....		
Acid yellow D.....	79. {	Egg-yellow ppt.
Tropaeoline O O.....		
Fast yellow.....		
Diphenyl orange.....		
Diphenylamine orange.....		
Jaune d'aniline.....		
RED—Continued.		
Orange I.....	192. {	Turns red, in conc. sol. red ppt.
Naphthol orange.....	242. {	Yellow-red ppt.
a-Naphthol orange.....	253. {	Yellow-red ppt.
Tropaeoline O O No. 1.....	280. {	Turns redder.
Cloth orange.....		
Tolylene orange R R.....		
Pyramine orange.....		
Azo orange R.....		
Alizarine orange A in paste.....		
Alizarine O R.....		
Alizarine O G.....		
Alizarine orange.....		
Alizarine orange N.....	389. {	Fuchsine red; on addition of zinc dust turns blue, then yellow-brown, which turns blue on exposure to the air.
Alizarine orange A O.....		
Alizarine orange powder.....		
Alizarine orange A O P.....		
Alizarine brown.....		
Alizarine orange G.....	400. {	Blood-red.
NO REACTION:		
Cotton orange G.....	111. {	
Cotton orange R.....	162. {	
Tolylene orange R.....		
Kanthosine R.....	201. {	
Congo orange R.....	215. {	

BROWN.

On H₂ SO₄.

BLACK :

Mikado brown B, 3 G O, M.....	14.	{ Red - black to blue-black.
Hessian brown B B.....	277.	
Hessian brown M M.....	278.	

BROWN :

Brun P M.....	37.	Red-brown.
Chrysoidine R.....	41.	
Leather brown.....	160.	
Resorcin brown.....	163.	
Bismarck brown.....	{	
Bismarck brown G.....		
Manchester brown.....		
Phenylene brown.....		
Vesuvine.....		
Aniline brown.....		172.
Leather brown.....		
Cinnamon brown.....		
Cannelle.....		
English brown.....		
Gold brown.....		
Vesuvine B.....	{	
Manchester brown E E, P S.....		
Bismarck brown.....		174.
Bismarck brown T.....		
Brun Bismarck E E.....		
Benzo brown G.....	273.	Violet-brown.
Direct brown J.....	275.	

VIOLET :

Sulfamine brown β.....	{	65.	
Brun naphthine β.....			
Naphthylamine brown.....	{	92.	
Fast brown N.....			
Azo brown O.....			
Chrome brown R O.....			
BLACK :			
Mikado brown B, 3 G O, M.....	14.	{ Red - black to blue-black.	
Hessian brown B B.....	277.		
Hessian brown M M.....	278.		
BROWN :			
Brun P M.....	37.	Red-brown.	
Chrysoidine R.....	41.		
Leather brown.....	160.		
Resorcin brown.....	163.		
Bismarck brown.....	{		
Bismarck brown G.....			
Manchester brown.....			
Phenylene brown.....			
Vesuvine.....			
Aniline brown.....		172.	
Leather brown.....			
Cinnamon brown.....			
Cannelle.....			
English brown.....			
Gold brown.....			
Vesuvine B.....	{		
Manchester brown E E, P S.....			
Bismarck brown.....		174.	
Bismarck brown T.....			
Brun Bismarck E E.....			
Benzo brown G.....	273.	Violet-brown.	
Direct brown J.....	275.		
VIOLET :			
Sulfamine brown β.....	{	65.	
Brun naphthine β.....			
Naphthylamine brown.....	{	92.	
Fast brown N.....			
Azo brown O.....			
Chrome brown R O.....			

VIOLET—Continued.

Alkali brown	{	110.	Blue-violet.
Alkali brown R.....			
Benzo brown B.....			
Terra cotia F.....	161.	Red-violet.	
Fast brown G.....	{	165.	
Acid brown			
Fast brown (O N T yellowish).....	166.		
Diamine brown V.....	182.		Blue-violet.
Cloth brown reddish.....	193.		Blue-violet.
Cloth brown yellowish.....	194.		Red-violet.
Diamine bronze G.....	263.		Blue-violet.
Congo brown G.....	269.		Red-violet.
Congo brown R.....	270.		
Benzo brown B.....	274.		Dirty violet.
Toluyene brown.....	276.		Dirty red-violet.

BLUE :

Pigment brown.....	{	55.	
Sondan brown.....			
Fast brown 3 B.....	103.		

GREEN :

Sulfamine brown A.....	{	57.	
Naphthine a.....			

YELLOW :

Chrysoidine	{	16.	Brown-yellow.
Chrysoidine G.....			
Chrysoidine R, J, Y.....			

RED :

Fast brown.....	164.	Corinth-red.
Toluyene brown G.....	241.	Brown-red.

REP—Continued.	
Chrysoidine R.....	41. Slimy ppt.
Naphthylamine brown.....	
Fast brown N.....	92. Fuchsine red.
Azo brown O.....	
Chrome brown R O.....	
Fast brown (O N T yellowish).....	166.
Bismarck brown.....	
Bismarck brown G.....	
Manchesier brown.....	
Phenylene brown.....	
Vesuvine.....	172.
Aniline brown.....	
Leather brown.....	
Cinnamon brown.....	
Cannelle.....	
English brown.....	
Gold brown.....	
Vesuvine B.....	
Manchesier brown E E.....	
Manchesier brown P S.....	174. First red, then brown.
Bismarck brown.....	
Bismarck brown T.....	
Brun Bismarck E E.....	
Thioacetazine.....	492. Brown-red ppt.
Thioacetazine S.....	

BROWN.

On addition of HCl to Water Solution.

BLACK :	
Polybromine B.....	
Cotton brown R.....	243. Blue-black ppt.
Fast cotton brown R.....	
Direct brown R.....	

BROWN :	
Mikado brown B, 3 G O, M.....	14. Ppt.
Brun P M.....	37. Yellow brown.
Chrysoidine R.....	41. Light brown ppt.
Alkali brown.....	
Alkali brown B.....	110. Dark brown ppt.
Benzo brown.....	
Benzo brown 5 R.....	
Leather brown.....	160. Turns lighter.
Terra cotta F.....	161. Ppt.
Resorcin brown.....	163. Ppt.
Fast brown.....	164. Red brown ppt.
Vesuvine B.....	
Manchesier brown E E.....	
Manchesier brown P S.....	174.
Bismarck brown.....	
Bismarck brown T.....	
Brun Bismarck E E.....	
Diamine brown V.....	182. Chocolate-brown ppt.
Cloth brown reddish.....	183. Ppt.
Cloth brown yellowish.....	194. Ppt.
Toluyene brown G.....	241. Ppt.
Diamine bronze G.....	263. Ppt.
Congo brown G.....	269. Ppt.
Congo brown R.....	270. Ppt.
Benzo brown G.....	273. Ppt.
Benzo brown B.....	274. Ppt.
Direct brown, J.....	275. Dark brown ppt.
Toluyene brown.....	276. Ppt.
Hessian brown B B.....	277. Ppt.
Hessian brown M M.....	278. Ppt.
VIOLLET :	
Fast brown 3 B.....	103. Red-violet.
Fast brown G.....	Ppt., soluble in dil.
Acid brown.....	HCl with violet, in
Fast brown (O N T yellowish).....	165. water with brown color.
	166. Ppt.

BROWN—Continued.

YELLOW:		BROWN.	
On Addition of NaOH to Water Solution.		On Addition of NaOH to Water Solution.	
Chrysoidine	16.	Chrysoidine	16.
Chrysoidine G		Chrysoidine G	
Chrysoidine R		Chrysoidine R	
Chrysoidine J		Chrysoidine J	
Chrysoidine Y		Chrysoidine Y	
RED:		Brun P M	37.
Naphthylamine brown		Sulfamine brown A	57.
Fast brown N		Naphtine a	65.
Azo brown O		Sulfamine brown B	
Chrome brown R O		Naphtine β	
NO REACTION:		Naphthylamine brown	
Sulfamine brown A	57.	Fast brown N	92.
Brun naphtine a		Azo brown O	
Sulfamine brown B		Chrome brown R O	
Brun naphtine β	65.	Leather brown O	160.
Bismarck brown		Terra cotta F	161.
Bismarck brown G		Bismarck brown	
Brun Bismarck		Bismarck brown G	
Manchester brown		Manchester brown	
Phenylene brown		Phenylene brown	
Vesuvine	172.	Vesuvine	
Aniline brown		Aniline brown	172.
Leather brown		Leather brown	
Cinnamon brown		Cinnamon brown	
Cannelle		Cannelle	
English brown		English brown	
Gold brown		Gold brown	
Anthracene brown in paste		Vesuvine B	
Anthracene brown A in paste		Manchester brown E	
Anthracene brown G in paste	396.	Manchester brown P S	174.
Alizarine brown in paste		Bismarck brown T	
Alizarine brown powder		Brun Bismarck E E	
Rufgallol	408.		

BROWN—*Continued.*

Diamine brown V	182.	Ppt.
Cloth brown reddish	193.	{ In conc. sol. small quantity of ppt.
Cloth brown yellowish	194.	Red-brown.
Polychromine B	{ 243.	Ppt.
Cotton brown R		
Fast cotton brown R	{ 273.	{ In conc. sol. floccy ppt.
Direct brown R		
Benzo brown G	273.	Red-brown.
Hessian brown M M	273.	Red-brown.

BLUE:

Anthracene brown in paste	{ 396.	Green-blue.
Anthracene brown R in paste		
Anthracene brown G in paste		
Alizarine brown in paste		
Alizarine brown powder	{ 403.	Unstable.
Rufgallol		

YELLOW:

Chrysoidine R	41.	Ppt.
Fast brown (O N T yellowish)	166.	Red-yellow.
Diamine bronze G	263.	Turns yellow.

RED:

Fast brown 3 B	103.	Fuchsine red.
Alkali brown	{ 110.	Ppt.
Alkali brown R		
Benzo brown 5 R		
Fast brown	164.	Cherry-red.
Fast brown G	{ 165.	Cherry-red.
Acid brown		
Congo brown G	269.	
Congo brown R	270.	
Hessian brown B B	277.	Deep red.

No Reaction:

Mikado brown B, 3 G O, M	14.	Almost no reaction.
Resorcin brown	163.	Almost no reaction.
Toluylene brown G	241.	
Direct brown J	275.	
Toluylene brown	276.	

RED.

O H_2SO_4 .

VIOLET.		VIOLET—Continued.	
Chromotrope 2 B.....	33.	Rouge I.....	
Azo fuchsine B.....	44.	Brilliant red.....	102.
Fast red B T.....	60.	Rubidine.....	
Crystal ponceau.....	62.	Rauracienne.....	
Crystal ponceau 6 R.....	64.	Ceracine.....	
Azo Turkey red.....	87.	Orcelline No. 4.....	
Azo fuchsine G.....		Cloth red G, R.....	152. Blue-violet.
Azo ruby.....		Fast red 7 B.....	123.
Azo ruby A, S.....		Croceine B, A, Z.....	
Azo acid ruby.....		Brilliant croceine M.....	
Azo fuchsine acide.....	93.	Brilliant croceine.....	
Fast red C.....		Brilliant croceine bluish.....	134. Red-violet.
Carmoisine.....		Cotton scarlet.....	
Brilliant carmoisine O.....		Cotton scarlet 3 B conc.....	
Rouge rubis A.....		Ponceau B O extra.....	
Fast red E, S.....	94.	Paper scarlet bluish.....	
Acid carmoisine B.....		Ponceau 5 R.....	125. Red-violet.
Croceine 3 B X.....	95.	Erythrine X.....	138.
Fast red D, E B, N S.....		Fulling orange.....	
Amaranth.....		Diamine scarlet B.....	
Azo acid ruby 2 B.....		Diamine scarlet 3 B.....	184.
Bordeaux D H, S.....		Diamine Bordeaux B.....	
Foupre.....	96.	Diamine Bordeaux S.....	
Naphthol red S, O.....		Hessian Bordeaux.....	244. Blue-violet.
Victoria ruby.....		Hessian purple B.....	247.
Wool red extra.....		Hessian purple D.....	248.
Guanthine.....		Azo Corinth.....	271.
Ponceau 6 R.....	98.	Alizarine Bordeaux.....	402. Blue-violet.
Roxamine.....	99.	Alizarine Bordeaux B in paste 20%.....	
Fast red B.....	101.	Alizarine Bordeaux B D in paste.....	
Fast red A.....		Alizarine Bordeaux G.....	
Fast red.....		Alizarine Bordeaux G G.....	
Fast red O.....		Rose magdala.....	172. Gray-violet.
Roscelline.....	102.	(Magdala red).....	
		Naphthylamine pink.....	

VIOLET—Continued.

Fast pink for silk.....	
Naphthalinized	
Naphthaline pink	172.
Naphthaline scarlet	
Soudan red	

BLUE :

Azo Bordeaux.....	58.
Buffalo ruby	
Palatine red	
Azo red A	59.
Naphtho ruby	
Fast red B	
Bordeaux B	
Bordeaux B L, G	61.
Bordeaux R extra	
Ceriseine	
Rouge B	
Chromotrope 10 B	63.
Congo G R	119.
Cloth red 3 G extra	
Cloth red 3 G A	126.
Cloth red 3 B extra	127.
Cloth red B	129.
Croceïne 3 B	130.
Cloth red G	
Cloth red G extra	131.
Cloth red G A	
Cloth red B	
Cloth red O	
Cloth red B A	132.
Fast Bordeaux O	
Azo fuchsine acide	
Or-eille red A	
Union fast claret	134.
Fast scarlet B	136.
Croceïne scarlet 3 B	
Ponceau 4 R B	137.

BLUE—Continued.

Croceïne scarlet O extra	141.
Fast ponceau 2 B	142.
Or-eille B B	144.
Bordeaux G	145.
Croceïne scarlet 7 B	
Croceïne scarlet 8 B	146.
Ponceau 6 R B	
Brilliant croceïne 9 B	156.
Glycine Corinth	176.
Glycine red	177.
Congo	
Rouge Congo	178.
Brilliant Congo G	
Gladioline O	
Gladioline 1, 2	179.
Rouge Congo brillante G	
Rouge M	181.
Diamine fast red F	
Rouge solide diamine F	191.
Benzo purpurine 4 B	
Cotton red 4 B	202.
Benzo purpurine 6 B	203.
Benzo purpurine B	204.
Diamine red B	
Delta purpurine 5 B	205.
Diamine red 3 B	
Delta purpurine 7 B	206.
Rosazurine G	207.
Rosazurine B	208.
Brilliant purpurine E	209.
Brilliant Congo R	
Rouge Congo brillante R	210.
Congo 4 R	
Rouge Congo 4 R	213.

Dark blue

RED—Continued.

BLUE—Continued.		
Diamine red N O.....	225.	
Benzo purpurine 10 B.....	231.	
Naphthylene red.....	240.	
Hessian purple N.....	245.	
Hessian brilliant purple.....	246.	
GREEN :		
Sudan III.....	121.	
Cerarine red.....	128.	
Red C.....	133.	
Fat ponceau.....	135.	
Bordeaux B X.....		Blue-green.
Cloth scarlet G.....		
Ponceau 3 R B.....		
Ponceau B extra.....		
Fast ponceau B.....		
New red L.....		
Scarlet E C.....	140.	
Imperial scarlet.....		
Old scarlet.....		
Bearlake B.....		
Biebrich scarlet.....		
Cloth scarlet R.....	143.	
Bordeaux B X.....	147.	
Neutral red.....		Dark green.
Rouge neutre extra.....	449.	
Azo carmine G in paste.....	451.	
Rosazine.....		
Azo carmine B.....		
Rosinduline 2 B bluish.....	452.	
Rosinduline 2 G.....	453.	Dirty green.
Rosinduline G.....	454.	Dirty green.
Safranine.....		
Safranine T.....		
Safranine extra G.....	461.	
Safranine G extra.....		
GREEN—Continued.		
Safranine G S. S.....		
Safranine G O O.....		
Safranine F extra No. 0.....		
Safranine conc.....		461.
Safranine A G extra.....		
Safranine A G T extra.....		
Aniline pink.....		
Pink.....		
BROWN :		
Fuchsine.....		
Superfine magenta crystals.....		
Best magenta.....		
Ruby magenta.....		
Roseline.....		
Diamant gros cristaux.....		
Aniline red.....		
Nitrobenzol fuchsine.....		
Rosoniline base.....		
Magenta base.....		
Rhodamine B.....		
Rhodamine B extra.....		
Rhodamine O, extra B.....		
Safraniline.....	346.	With evolution of HCl, yellow-brown.
Rose Bengale.....		
Rose Bengale 3 B.....	365.	
Alizarine granat R.....		
Alizarine cardinal.....	390.	
Alizarine R G and G I.....		
Alizarine S D G.....		
Alizarine X.....		
Alizarine No. 10.....	398.	Red-brown.
Alizarine C A.....		
Flavo purpurine.....		
COLORLESS :		
Chinoline red.....	486.	
Azaline.....		

YELLOW :

Cerarine orange G.....	15.	Brown-yellow.
Sondan G.....	299.	
p-Fuchsin.....	301.	
New fuchsin.....	310.	
Iso Ruby.....	340.	
Fuchsine S.....	341.	
Acid magenta.....	342.	
Acid fuchsin.....	343.	
Maron S.....	344.	
Grenat S.....	345.	
Acid carise.....	347.	
Coraline.....	350.	
Red coralline.....		
Aniline R.....		
Paeonine.....		
Pyronine B.....		
Acridine red B, B B, 3 B.....		
Rhodamine S.....		
Rhodamine 6 G.....		
Rhodamine G, G extra.....		
Rhodamine 3 B.....		
Antsoline.....		
Acid resamine A.....		
Violamine G.....		
Eosine A.....		
Eosine.....		
Eosine yellowish.....		
Eosine G extra.....		
Eosine G G F.....		
Eosine water soluble.....		
Eosine 3 J.....		
Eosine 4 J extra.....		
Eosine extra.....		
Eosine K S ord.....		
Eosine D H, J J F.....		

YELLOW—Continued.

Eosine alcohol soluble.....	355.	{ On warming, brome evolution.
Primrose à l'alcool D H.....		
Methyl eosine.....		
Eosine S, B B.....	356.	{ On warming, brome evolution.
Rose J B à l'alcool.....		
Alcohol eosine.....		
Eosine alcohol soluble.....		
Primrose à l'alcool.....		
Primrose.....		
Eosine B N.....		
Methyl eosine.....		
Safranine.....		
Eosine scarlet B.....		
Eosine B.....		
Ecarlate J, J J, V.....	357.	{ On warming, brome evolution.
Nopiline.....		
Eosine scarlet B B extra.....		
Eosine B W.....		
Kaiser red.....		
Lutetienne.....		
Eosine, D H V.....		
Erythrosine G.....		
Dianthine G.....	358.	{ Brown-yellow, on warming iodine evolution.
Pyronine J.....		
Iodine eosine G.....		
Jaune d'Orient.....		
Erythrosine.....		
Erythrosine D, B.....		
Pyronine B.....		
Iodine eosine B.....		
Rose B à l'eau.....	359.	{ Brown-yellow, on warming iodine evolution.
Primrose soluble.....		
Eosine bluish.....		
Eosine bleuâtre.....		
Eosine J.....		
Dianthine B.....		
Phloxine P.....	360.	{ Brown-yellow, no re-action on warming.
Phloxine.....		
Erythrosine B B.....		
New pink.....		

RED—Continued.

Double scarlet extra S.....	
Double brilliant scarlet 3 R.....	105.
Earlate brillante.....	
Brilliant ponceau 4 R.....	
Double scarlet 2 R.....	
Fast acid ponceau.....	
Ponceau acide.....	106.
Fast acid scarlet.....	
Salmon red.....	169.
Salmon red.....	171.
Cotton ponceau.....	175.
Cinnabar scarlet.....	
Anthracene red.....	198.
Rock scarlet Y S.....	238.
Rouge de St. Denis.....	
Patent rock scarlet.....	259.
Dianthine.....	
Acid and milling scarlet.....	260.
Alizarine V 1.....	
Alizarine No. 1.....	
Alizarine I e.....	
Alizarine No. I B new.....	388.
Alizarine P.....	
Alizarine for violet.....	
Alizarine maroon in paste.....	394.
Alizarine red S.....	
Alizarine W S powder.....	
Alizarine powder W.....	395.
Alizarine powder S A.....	
Alizarine carmine.....	
Alizarine S X.....	
Alizarine S X extra.....	
Alizarine G D.....	
Alizarine R X.....	399.
Alizarine S C.....	
Anthra purpurine.....	
Induline scarlet.....	450.
Bordeaux red.....	

RED.

On addition of H₂O to H₂SO₄ Solution.

BLACK:	
Brilliant Purpurine R.....	209.
Brilliant congo R.....	
Rouge congo brilliant R.....	210.
Diamine red N O.....	225.
Naphthylene red.....	240.
Hessian purple N.....	245.
Hessian brilliant purple.....	246.
Blue-black ppt.	
Brown-black ppt.	
Black ppt.	
Blue-black ppt.	
Blue-black ppt.	
Blue-black ppt.	
VIOLLET:	
Chromotrope 10 B.....	63.
Fast red D, E B, N S.....	
Amaranth.....	
Azo acid ruby 2 B.....	
Bordeaux D H, S.....	
Pourpre.....	96.
Naphthol red S, O.....	
Victoria ruby.....	
Wool red extra.....	
Enanthine.....	
Croceine B, A, Z.....	123.
Croceine 3 B.....	130.
Croceine scarlet 7 B, 8 B.....	146.
Ponceau 6 R B.....	
Salmon red.....	169.
Salmon red.....	171.
Glycine Corinthe.....	176.
Glycine red.....	177.
Brilliant Congo G.....	
Gladoline O, 1, 2.....	179.
Rouge Congo brillante G.....	
Rosazurine G.....	207.
Rosazurine B.....	208.
Red-violet.	
Ppt; later fuchsine-red sol.	
Red violet.	
Blue-violet ppt.	
Blue-violet ppt.	
Ppt.	
Ppt.	
Ppt.	
Red-violet ppt.	
Ppt.	

RED—Continued.

VIOLET—Continued.

Congo 4 R.....	213.	Ppt.
Rouge Congo 4 R.....	244.	Blue-violet ppt.
Hessian Bordeaux.....	472.	Red-violet ppt.
Rose margala.....		
(Macedale red).....		
Naphthylamine pink.....		
Rast pink for silk.....		
Naphthaline red.....		
Naphthaline pink.....		
Naphthaline scarlet.....		
Soudan red.....		
Fast red D, E B, N S.....		
Amaranth.....		
Azo acid ruby 2 B.....		
Bordeaux D H. S.....		
Pourpre.....	96.	Violet-blue.
Naphthol red S, O.....		
Victoria ruby.....		
Wool red extra.....		
Enanthine.....	119.	Ppt.
Congo G R.....		
Soudan III.....	121.	Later red ppt.
Cerise red.....		
Red C.....		
Brilliant croceine M.....		
Brilliant croceine.....		
Brilliant croceine bluish.....	124.	{ First blue sol., later brown ppt.
Cotton scarlet.....		
Cotton scarlet 3 B conc.....		
Ponceau B O extra.....		
Paper scarlet bluish.....		
Ponceau 5 R.....	125.	Later red sol.
Erythrine X.....		
Cloth scarlet G.....	135.	{ Then red to scarlet- red.

BLUE—Continued.

Ponceau 3 R B.....		
Ponceau B extra.....		
Rast ponceau B.....		
New red L.....	140.	{ First blue sol., then brown-red flocks.
Scarlet E C.....		
Old scarlet.....		
Imperial scarlet.....		
Ecclaire B.....		
Biebrich scarlet.....		
Cloth scarlet R.....	143.	Blue to red.
Bordeaux B X.....	147.	{ First blue sol., then brown-red ppt.
Salmon red.....	169.	Violet-blue ppt.
Salmon red.....	171.	Violet-blue ppt.
Congo.....		
Rouge Congo.....	178.	Ppt.
Benzo purpurine 4 B.....	202.	Ppt.
Cotton red 4 B.....		
Benzo purpurine 6 B.....	203.	Ppt.
Benzo purpurine 10 B.....	231.	Ppt.
Hessian Bordeaux.....	244.	Violet-blue ppt.
Neutral red.....	449.	Later fuchsine red.
Rouge neutre extra.....		
Safranine.....		
Safranine T.....		
Safranine extra G.....		
Safranine G extra.....		
Safranine G S. S.....		
Safranine G 0 0.....		
Safranine F extra No. 0.....	461.	Later red.
Safranine conc.....		
Safranine A G extra.....		
Safranine A G T extra.....		
Aniline pink.....		
Pink.....		

BROWN:		
Induline scarlet.....	450.	Turning red later.
COLORELESS:		
Rouge M.....	181.	
p-Fuchsin.....	299.	
Fuchsin, Ruby, Magenta, Rosine, Fuchsin.....		
Diamant gros cristaux.....	300.	{ Almost colorless, basic ppt.
Aniline red.....		
Nitrobenzole fuchsin.....		
Rosaniline base.....		
Magenta base.....		
BROWN:		
Sudan G.....	18.	Light brown ppt.
Cerasing orange G.....		
Palatine scarlet.....		
Brilliant cochenille 2 R, 4 B.....	50.	Yellow-brown ppt.
Cochonille scarlet P S.....		
Palatine red.....		
Azo red A.....	59.	Ppt.
Naphtho ruby.....		
Azarine S.....	66.	Red-brown ppt.
Azarine R.....		
Fast red B.....	101.	Yellow-brown ppt.
Fast red A.....		
Fast red.....		
Fast red O.....		
Roccelline.....		
Rouge I.....	102.	Yellow-brown ppt.
Brilliant red.....		
Rubidine.....		
Rauvaccine.....		
Cerasing.....		
Orcelline No. 4.....		
Fast acid poncaut.....		
Poncaut acide.....	106.	Ppt.
Fast acid scarlet.....		
BROWN—Continued.		
Brilliant croceine M.....		
Brilliant croceine.....		
Brilliant croceine bluish.....	124.	{ First blue solution, then brown ppt.
Cotton scarlet.....		
Cotton scarlet 3 B conc.....		
Poncaut B O extra.....		
Paper scarlet bluish.....		
Orcelle red A.....	134.	Red-brown flocks.
Union fast claret.....		
Croceine scarlet 3 B.....	137.	{ Yellow-brown ppt., with more water red sol.
Poncaut 4 R B.....		
Diamine scarlet B.....		
Diamine scarlet 3 B.....	184.	
Diamine Bordeaux B.....		
Diamine Bordeaux S.....		
Diamine fast red F.....	191.	Ppt.
Rouge solide diamine F.....		
Benzo purpurine B.....	204.	Dark brown flocks.
Diamine red B.....		
Delta purpurine 5 B.....	205.	Ppt.
Diamine red 3 B.....		
Delta purpurine 7 B.....	206.	Yellow-brown ppt.
Hessian purple B.....	247.	Ppt.
Hessian purple D.....	248.	
Azo Corinthe.....	271.	Reddish-brown ppt.
Acid rosamine A.....	350.	{ Red-brown sol., later red flocks.
Violine G.....		
Phloxine P.....		
Phloxine.....	300.	{ Slightly brownish ppt.
Erythrosine B B.....		
New pink.....		
Cyanosine alcohol soluble.....	361.	Red-brown ppt.
Purpurine in paste.....	397.	Red-brown ppt.
Azarine No. 6.....		

RED—Continued.

Cochenille scarlet 4 R.....	48.	Reddish ppt.
Wool scarlet R.....	49.	
Brilliant orange R.....		
Scarlet G R, R.....	51.	Brown-red ppt.
Xylidine orange.....		
Orange N.....		
Azo Bordeaux.....	58.	Fuchsine red.
Buffalo ruby.....		
Fast red B T.....	60.	Dark brown-red ppt.
Fast red B.....		
Bordeaux B, B L, G, R extra.....	61.	Fuchsine red.
Cerastine.....		
Rouge B.....		
Crystal ponceau.....	62.	Scarlet-red.
Crysud ponceau 6 R.....		
Azo turkey red.....	64.	Yellow-red.
Azo eosine.....	47.	Brown-red ppt.
Azo cochenille.....	68.	Yellow-red.
Erika B.....	72.	Ppt.
Azo fuchsine G.....	57.	Bluish-red.
Azo ruby A, S.....		
Azo acid ruby.....		
Azo fuchsine acids.....		
Fast red C.....	93.	Fuchsine red.
Carmoisine.....		
Brilliant carmoisine O.....		
Rouge rubis A.....		
Fast red E, S.....	94.	
Acid carmoisine B.....		
Croceine 3 B X.....	95.	Yellow-red.
Cochenille red A.....		
Croceine scarlet 4 B X.....		
Brilliant scarlet.....		
Brilliant ponceau 5 R.....		
Ponceau 4 R.....	97.	Yellow rail.
Ponceau brilliant 5 R.....		
New eosine.....		
Scarlet.....		

RED—Continued.

Ponceau 6 R.....	98.	Fuchsine red.
Double brilliant scarlet G.....		
Double scarlet G.....	104.	Brown-red ppt.
Scarlet for silk.....		
Double scarlet extra S.....		
Double brilliant scarlet 3 R.....		
Ecarlate brillante.....	105.	Yellow-red.
Brilliant ponceau 4 R.....		
Double scarlet 2 R.....		
Cloth red G, R.....		
Fast red 7 B.....	122.	Brown-red ppt.
Ponceau 5 R.....		
Erythrine X.....	125.	First blue, then red.
Cloth red 3 G extra.....	126.	Dark brown-red ppt.
Cloth red 3 G A.....		
Cloth red 3 B extra.....	127.	Dirty red.
Fat ponceau.....	128.	Ppt.
Croceine 3 B.....	130.	Violet ppt., then fuchsine-red sol.
Cloth red G, G extra, G A.....	131.	Brown-red ppt.
Cloth red B, O, B A.....		
Fast Bordeaux O.....	132.	Brown-red ppt.
Azo fuchsine acids.....		
Bordeaux B X.....	133.	Brown-red ppt.
Cloth Scarlet G.....	135.	First blue, then red, then scarlet.
Fast scarlet B.....	136.	
Croceine scarlet 3 B.....		
Ponceau 4 R B.....	137.	Yellow-brown ppt., with more water red sol.
Ponceau 3 R B, B extra.....		
Fast ponceau B.....		
New red L.....		
Scarlet E C.....	140.	First blue sol., then brown-red flocks.
Imperial scarlet.....		
Old scarlet.....		
Ecarlate B.....		
Biebrich scarlet.....		

RED—Continued.

Safranine G 0 0.	.....	54.	Ppt.
Safranine F extra No. 0.	.....	70.	Blue-violet.
Safranine conc.	.....	123.	Ppt.
Safranine A G extra.	.....	130.	Ppt.
Safranine A G T extra.	.....	141.	Red-violet.
Aniline pink.	.....	144.	Blue-violet ppt.
Pink.	.....	169.	Blue-violet ppt.
Rose magdala	.....	176.	Ppt.
(Magdala red)	.....	177.	Ppt.
Naphthylamine pink.	.....	179.	Brown-violet ppt.
Fast pink for silk.	.....	207.	Red-violet ppt.
Naphthaline red.	.....	208.	Red-violet ppt.
Naphthaline pink.	.....	213.	Ppt.
Naphthaline scarlet.	.....	225.	Ppt.
Soudan red.	.....	240.	Black-violet ppt.
Chinoline red.	.....	
Azaline.	.....	
No REACTION:			
Apollo red.	.....	31.	
Orseille substitute N extra.	.....	53.	
Ponceau 3 R, 4 R.	.....	69.	
Cocchine B.	.....	175.	
Cotton porccan.	.....	
Ginnabar scarlet.	.....	

RED.

On Addition of HCl to Water Solution.

BLACK:			
Atles red.	.....	119.	Ppt.
Brilliant purpurine R.	.....	209.	Ppt.
Naphthylene red.	.....	240.	Violet-black ppt.
Hessian purple N.	.....	245.	Blue-black ppt.
Hessian brilliant purple	.....	246.	Blue-black ppt.
Hessian purple B.	.....	247.	Brown-black ppt.
VIOLET:			
Rose de benzoyle.	.....	54.	Ppt.
Rouge d'oxy-amido-diphénile	.....	70.	Blue-violet.
Croceïne B.	.....	123.	Ppt.
Croceïne A Z.	.....	130.	Ppt.
Croceïne 3 B.	.....	141.	Red-violet.
Croceïne scarlet O extra	.....	144.	Blue-violet ppt.
Orselline B B.	.....	169.	Blue-violet ppt.
Salmon red.	.....	176.	Ppt.
Salmon red.	.....	177.	Ppt.
Glycine corinth.	.....	179.	Brown-violet ppt.
Glycine red.	.....	207.	Red-violet ppt.
Brilliant Congo G.	.....	208.	Red-violet ppt.
Ghidioline O, 1, 2	.....	213.	Ppt.
Rouge Congo brillante G.	.....	225.	Ppt.
Rosazurine G.	.....	240.	Black-violet ppt.
Rosazurine B.	.....	
Congo 4 R.	.....	
Rouge Congo 4 R.	.....	
Diamine red N O.	.....	
Naphthylene red.	.....	
Safranine.	.....	
Safranine T.	.....	
Safranine extra, G.	.....	
Safranine G extra, G G S, S.	.....	
Safranine G 0 0.	.....	
Safranine F extra No. 0.	.....	461.	Blue-violet.
Safranine conc.	.....	
Safranine A G extra.	.....	
Safranine A G T extra.	.....	
Aniline pink.	.....	
Pink.	.....	
Rose magdala	.....	
(Magdala red)	.....	
Naphthylamine pink.	.....	472.	More violet.
Fast pink for silk.	.....	
Naphthaline red.	.....	
Naphthaline pink.	.....	
Naphthaline scarlet.	.....	
Soudan red.	.....	

BROWN—Continued.

Fast acid ponceau, (Ponceau acide).....	106.	Ppt.
(Fast acid scarlet).....		
Brilliant Crocine M.....		
Brilliant Crocine.....		
Brilliant Crocine bluish.....		
Cotton scarlet.....	124.	Brown ppt.
Cotton scarlet 3 B conc.....		
Ponceau B O extra.....		
Paper scarlet bluish.....		
Ponceau 5 R.....	125.	Flocks.
Erythrine X.....		
Cloth red 3 G extra.....	126.	Dark red-brown ppt.
Cloth red 3 G A.....		
Cloth red 3 B extra.....	127.	{ Dirty brown ppt., on large excess green- blue sol.
Cloth red B, O, B A.....		
Fast Bordeaux O.....	132.	Brownish.
Azo fuchsine acide.....		
Bordeaux B X.....	133.	Brownish-red ppt.
Fast scarlet B.....	136.	
Crocine scarlet 3 B.....		
Ponceau 4 R B.....	137.	{ Yellow-brown flocky ppt.
Bordeaux B X.....	147.	Dark red-brown ppt.
Brilliant crocine 9 B.....	156.	Brownish.
Brilliant Congo G R.....		
Rouge Congo brillante G.....	179.	Brownish-violet p. t.
Gladioline O, 1, 2.....		
Rouge M.....	18.	Brownish.
Diamine fast red F.....	191.	Ppt.
Rouge solide diamine F.....		
Benzo purpurine B.....	204.	Ppt.
Diamine red B.....		
Delta purpurine 5 B.....	205.	Ppt.

BROWN—Continued.

Diamine red 3 B.....		
Delta purpurine 7 B.....	206.	Ppt.
Rouge diamine 3 B.....		
Brilliant Congo R.....	210.	Red-brown ppt.
Hessian purple B.....	247.	Brownish-black ppt.
Hessian purple D.....	248.	Ppt.
Azo corinth.....	271.	Reddish-brown ppt.
Eosine S, B B.....		
Rose J B à l'alcool.....		
Alcohol Eosine.....		
Eosine alcohol soluble.....		
Primrose à l'alcool.....	356.	Yellow-brown ppt.
Primrose.....		
Alizarine granat R.....	390.	
Alizarine cardinal.....		
Azo carmine B.....		
Rosinduline 2 B bluish.....	452.	Ppt.

COLORLESS:

Cyanosine alcohol sol.....	361.	{ In alcoholic sol. fluorescence dis- appears.
Phloxine.....		
Phloxine iodine free.....		
Phloxine T A.....	364.	{ Decolorized and red- dish flocky ppt.
Eosine bleu.....		
Cyanosine.....		
Eosine 10 B.....		

YELLOW:

Chromotrope 2 B.....	33.	Turns yellow.
Azarine S.....	66.	Orange-yellow ppt.
Azarine R.....		
Azo fuchsine G.....	87.	Turns yellow.
Cloth scarlet G.....	135.	{ Slightly yellower, in conc. sol. light-red flocky ppt.
Fulling orange.....	138.	Gray - yellow gelati- nous ppt.

RED—Continued.

Brilliant orange R.....		
Scarlet G R. E.....	51.	Brown-red ppt.
Xylidine orange.....		
Orange N.....		
Crystal ponceau.....	62.	{ Slightly darker, on excess brown crys- tals ppt.
Crystal ponceau 6 R.....		
Coccine B.....	69.	{ Slightly darker. Ppt.
Erika B.....	72.	
Clayton cloth red.....	109.	Ppt.
Stanley red.....		
Cloth red G.....		
Cloth red R.....	122.	Brown-red ppt.
Fast red 7 B.....		
Cloth red B.....	129.	Ppt.
Cloth red G, G extra.....		
Cloth red G A.....	131.	Brown-red ppt.
Bordeaux B X.....	133.	Brown-red ppt.
Orseille red A.....	134.	Brown-red flocks.
Union fast claret.....		
Cloth scarlet G.....	135.	{ Conc. sol. light-red flocky ppt.
Ponceau 3 R B.....		
Ponceau B extra.....		
Fast ponceau B.....		
New red L.....		
Scarlet E C.....	140.	Conc. sol. flocky ppt.
Imperial scarlet.....		
Old scarlet.....		
Ecavate B.....		
Biebrich scarlet.....		
Cloth scarlet B.....	143.	Ppt.
Bordeaux G.....	145.	Ppt.
Croceine scarlet 7 B.....		
Croceine scarlet 8 B.....	146.	{ Fuchsine red, slowly becoming turbid.
Ponceau 6 R B.....		

RED—Continued.

Diamine scarlet B.....		
Diamine scarlet 3 B.....	184.	Brown red.
Diamine Bordeaux B.....		
Diamine Bordeaux S.....		
Anthracene red.....	198.	Flocky ppt.
Rock scarlet Y S.....	258.	Ppt.
Rouge de St. Denis.....		
Patent rock scarlet.....	259.	Ppt.
Dianthine.....		
Rhodamine 6 G.....	344.	{ Conc. acid red ppt., dil. acid crystals ppt.
Rhodamine G.....		
Rhodamine G extra.....	345.	On dilution red.
Rhodamine B.....		
Rhodamine B extra.....		
Rhodamine G, extra B.....	346.	{ On excess scarlet-red which turns bluish- red on dil.
Safraniline.....		
Rhodamine 3 B.....		
Anisoline.....	347.	On dilution.
Acid rosamine A.....		
Violamine G.....	350.	Flocks.
Eosine.....		
Eosine A, G G F, 3 J, D H, J F.....		
Eosine yellowish.....		
Eosine G extra.....		
Water sol. eosine.....	354.	Yellow-red
Eosine 4 J extra.....		
Eosine extra.....		
Eosine K S ord.....		
Rose bengale.....		
Rose bengale N.....		
Rose bengale A T.....	353.	Brown-red ppt.
Rose bengale G.....		
Bengal pink.....		

RED—Continued.

RED—Continued.		No REACTION—Continued.	
Phloxine.....		Victoria ruby.....	96.
Phloxine iodine free.....		Wool red extra.....	
Phloxine T. A.....	364. { Decolorized and red-	Oenanthe.....	
Eosine bleu.....	dish floody ppt.		
Cyanosine.....			
Eosine 10 B.....		Cochenille red A.....	97.
Rose bengale.....	365.	Croceine scarlet 4 B X.....	
Rose bengale 3 B.....		Brilliant scarlet.....	
Azo carmine G in paste.....		Brilliant ponceau 5 R.....	
Rosazine.....	451. Ppt.	Ponceau 4 R.....	
		Ponceau brilliant 5 R.....	
		New cocine.....	
		Scarlet.....	
No REACTION :		Ponceau 6 R.....	98.
Chromotrope 2 R.....	25.	Roxamine.....	99.
Chromotrope 6 B.....	39.	Fast ponceau 2 B.....	142.
Ponceau 2 R, G, G R, R.....			Almost no reaction.
Brilliant ponceau G.....	52.		
Ponceau J.....			
Ponceau 3 R, 4 R.....	53.	Cotton ponceau.....	175.
Azo Bordeaux.....	58.	Cinnabar scarlet.....	260.
Buffalo ruby.....		Acid and milling scarlet.....	
Fast red B.....			
Bordeaux B, B L, G.....	61.	Fuchsine S.....	
Bordeaux R, extra.....		Acid magenta.....	
Cerasine.....		Ruby S.....	310.
Rouge B.....		Acid fuchsine.....	
Chromotrope 10 B.....	63.	Fuchsine acide.....	
Azo Cochenille.....	68.	Marron S.....	
Fast red E, S.....		Grenat S.....	
Acid carmoisine B.....	94.	Acid cerise.....	
Croceine 3 B X.....	95.		
Fast red D, E, B, N S.....		Alizarine V 1.....	
Anarant.....		Alizarine No. 1.....	
Azo acid ruby 2 B.....	96.	Alizarine I e.....	988.
Bordeaux D H, S.....		Alizarine No. 1 B new.....	
Pourpre.....		Alizarine P.....	
Naphthol red S, O.....		Alizarine for violet.....	
		Alizarine marron in paste.....	394.
		Induline scarlet.....	450.

RED.

On addition of NaOH to water solution.

VIOLET:

Azarine S	66.	{ Ppt., on boiling red
Azarine R	122.	{ sol.
Cloth red G	123.	{ Red-violet ppt., water
Cloth red R		{ soluble.
Fast red B		
Grocine B		
Grocine A Z	128.	{ alcohol sol. red-violet.
Fat Ponceau	129.	
Cloth red B	130.	
Grocine 3 B	136.	{ Red-violet.
Fast scarlet B	141.	
Grocine scarlet O extra	142.	{ Conc. sol. ppt., sol-
Fast Ponceau 2 B	145.	{ uble in excess water.
Bordeaux G		
Grocine scarlet 7 B	146.	{ Dirty violet, in
Grocine scarlet 8 B		{ conc. sol. dirty-
Ponceau 6 R B		{ violet ppt.
Hessian purple B	247.	{ Red-violet ppt.,
		{ water soluble.
Azarine V 1		
Azarine No. I	388.	
Azarine Te		
Azarine No. I B new		
Azarine P		
Azarine for violet		
Azarine marron in paste	394.	
Azarine S		
Azarine W S powder	395.	
Azarine powder W		
Azarine powder S A		
Azarine carmine		

VIOLET—Continued.

Azarine R G and G I	395.	
Azarine S D G, X		
Azarine No. 10, C A		
Flavo purpurine		
Azarine S X, S X extra	399.	{ Blue-violet.
Azarine G D, R X, S C		
Antra purpurine		
Azarine Bordeaux B in paste 30%	403.	{ Red-violet.
Azarine Bordeaux B D in paste		
Azarine Bordeaux G, G G	450.	{ Ppt.
Induline scarlet		
Rose Magdala (Magdala red)		
Naphthylamine pink		
Fast pink for silk	472.	{ Red-violet ppt.
Naphthalene red		
Naphthalene pink		
Naphthalene scarlet		
Soudan red		
BLUE:		
Azo fuchsine B	44.	{ Turns bluer.
Azo fuchsine G	87.	{ Turns bluer.
BROWN:		
Orseille substitute 3 V N	30.	{ Brownish.
Orseille substitute V		
Apollo red	31.	{ Ppt., water soluble.
Orseille substitute N extra	60.	
Fast red B T		
Fast red B	61.	{ Yellow brown.
Bordeaux B, B L, G, R extra		
Gersine		
Ronge B		
Crystal Ponceau	62.	{ Light-brown.
Crystal Ponceau 6 R	67.	{ Yellow-brown.
Azo rosine	69.	{ Ppt.
Coccine B		

YELLOW—Continued.

Azo Cocine 2 R.....	37.	Brown-yellow.
Double scarlet R.....		
Palatine scarlet.....		
Brilliant cochenille 2 R.....	50.	Turns yellow.
Brilliant cochenille 4 R.....		
Cochenille scarlet F S.....		
Ponceau 8 R.....	53.	Ppt.
Ponceau 4 R.....		
Palatine red.....	59.	Turns yellow.
Azo red A.....		
Naphtho ruby.....		
Azo ruby A, S.....		
Azo acid ruby.....		
Azo fuchsine acide.....		
Fast red C.....	93.	Turns slightly yellow.
Carmoisine.....		
Brilliant Carmoisine O.....		
Rouge rubis A.....		
Brilliant congo R.....	210.	{ Red-yellow ppt. soluble in large quantity of water.
Acid rosamine A.....	350.	Turns yellow.
Violamine G.....		
Eosine S.....		
Eosine B.....		
Rose J B à l'alcool.....	356.	Brown-yellow ppt.
Alcohol rosine.....		
Eosine alcohol soluble.....		
Primrose à l'alcool.....		
Primrose.....		
ORANGE:		
Soudan G.....	18.	Orange-yellow.
Cerasin orange.....		
Cochenille scarlet G.....	21.	Orange yellow.
Cochenille scarlet 2 R.....	42.	
Rouge M.....	181.	
Rock scarlet Y S.....	258.	Orange-red.
Acid and milling scarlet.....	260.	Orange-red.

RED:

Orseille substitute V.....	29.	Brown-red ppt.
Chromotrope 2 B.....	33.	Blue-red.
Cochenille scarlet 4 R.....	48.	Yellow-red.
Woods-carlet R.....	49.	Deep yellow-red.
Rose de Benzoyl.....	54.	Brick-red.
Chromotrope 10 B.....	63.	Yellow-red.
Azarine S.....	66.	On boiling,
Azarine R.....		
Rouge d'oxy-amido-diphénile.....	70.	
Erika B.....	72.	Brinsh-red ppt.
Fast red D, E B, N S.....		
Amaranth.....		
Azo acid ruby 2 B.....		
Bordeaux D H, S.....		
Pourpre.....	96.	Turns darker.
Naphthol red S, O.....		
Victoria ruby.....		
Wool red extra.....		
Cenanthine.....		
Roxamine.....	99.	Turns darker.
Fast red B.....	101.	Slightly darker.
Fast red A.....		
Fast red O.....		
Rocceline.....		
Rouge I.....		
Brilliant red.....	102.	Turns turbid and darker.
Rubidine.....		
Rauracienne.....		
Cerarsine.....		
Orceiline No. 4.....	137.	Ppt.
Cloth red III B extra.....		
Bordeaux B X.....	138.	{ Conc. sol. brown red ppt.
Croceine scarlet 3 B.....	137.	{ Dirty violet-red, if conc. violet-red ppt.
Ponceau 4 R B.....		
Fulling orange.....	138.	Dark red ppt.

RED—Continued.

RED—Continued.	
Ponceau 3 R B.....	
Ponceau B extra.....	
Fast Ponceau B.....	
New red E.....	
Scarlet E C.....	140. Brown-red ppt.
Imperial scarlet.....	
Old scarlet.....	
Ecarlate B.....	
Biebrich scarlet.....	
Osselline B.....	144. Deeper yellow-red.
Cotton Ponceau.....	
Cinnabar scarlet.....	175. Deeper red.
Glycine Corinth.....	176. Ppt.
Glycine red.....	177. Yellow-red ppt.
Benzo purpurine 6 B.....	203. Ppt.
Diamine B.....	
Rouge Diamine B.....	205. Ppt.
Delta purpurine 5 B.....	
Diamine red 3 B.....	
Delta purpurine 7 B.....	
Rouge Diamine 3 B.....	206. Ppt.
Brilliant purpurine R.....	209. Ppt.
Benzo purpurine 10 B.....	331. Flocky ppt.
Hessian Bordeaux.....	244. Ppt.
Hessian purple N.....	245. Sol. and ppt., soluble in water.
Hessian brilliant purple.....	246. Carmine-red ppt.
Hessian purple D.....	248. Deeper blue-red.
Rock scarlet Y S.....	258. Orange-red.
Rouge de St. Denis.....	
Patent rock scarlet.....	259. Brick-red ppt.
Dianthine.....	
Acid and milling scarlet.....	260. Orange-red.
Azo Corinth.....	271. Bluish-red.
p-Fuchsin.....	299. Reddish crystal ppt. of base.
RED—Continued.	
New fuchsin.....	
Iso ruby.....	301. Light red crystal ppt. on boiling.
Pyronine G.....	340. Pale red ppt.
Pyronine B.....	341. Pale red ppt.
Acridine red B.....	342. Ppt.
Acridine red B B, 3 B.....	
Rhodamine 6 G.....	344. Ppt, soluble in benzole with yellow-brown color.
Rhodamine B.....	
Rhodamine B extra.....	
Rhodamine O.....	346. Red flocks, if heated with little NaOH; excess of NaOH, if cold, red flocks, soluble in ether and benzole; on heating notice dimethylamine smell.
Safraniline.....	
Rhodamine 3 B.....	347. If cold no reaction, on warming saponification with color base ppt.
Anisoline.....	
Alcohol soluble eosine.....	
Primrose alcohol D H.....	355. Turns darker with dark-green fluorescence.
Methyl eosine.....	
Phloxine P.....	
Phloxine.....	
Erythrosine B B.....	360. Deeper blue-red.
New pink.....	
Alizarine granat R.....	
Alizarine cardinal.....	390. Carmine-red.
Purpurine in paste.....	
Alizarine No. 6.....	397. Fuchsin red, rapidly decolorizing.
Rosinduline 2 G.....	453. Scarlet-red ppt.
Rosinduline G.....	454. Scarlet-red ppt.

RED—Continued.

Safraniline.....		
Safraniline T.....		
Safraniline extra G.....		
Safraniline G extra.....		
Safraniline G S. S.....		
Safraniline G 000.....		
Safraniline F extra No. 0.....	461.	Brown-red ppt.
Safraniline conc.....		
Safraniline A G extra.....		
Safraniline A G T extra.....		
Aniline pink.....		
Pink.....		
No Reaction:		
Sudan I.....	20.	
Carmine naphtha.....		
Chromotrope 2 R.....	25.	
Brilliant orange R.....		
Scarlet G R.....		
Scarlet R.....	51.	
Xylidine orange.....		
Orange N.....		
Ponceau 2 R.....		
Ponceau G.....		
Ponceau G R.....	52.	
Ponceau R.....		
Brilliant Ponceau G.....		
Ponceau J.....		
Azo Bordeaux.....	58.	
Bufalo ruby.....		
Azo cochénille.....	63.	
Double scarlet extra S.....		
Double brilliant scarlet 3 R.....		
Ecarlate brillante.....	105.	
Brilliant Ponceau 4 R.....		
Double scarlet 2 R.....		
Congo G R.....	119.	

No Reaction—Continued.

Cloth red 3 G extra.....	126.	
Cloth red 3 G A.....		
Salmon red.....	169.	
Salmon red.....	171.	
Brilliant Congo G.....		
Rouge Congo brilliant G.....		
Gladioline O.....	179.	Almost no reaction.
Gladioline 1.....		
Gladioline 2.....		
Diamine scarlet B.....		
Diamine scarlet 3 B.....	184.	
Diamine Bordeaux B.....		
Diamine Bordeaux S.....		
Diamine fast red F.....	191.	
Anthracene red.....	198.	
Benzo purpurine 4 B.....	202.	
Cotton red 4 B.....		
Benzo purpurine B.....	204.	
Rosazurine G.....	207.	Almost no reaction.
Rosazurine B.....	208.	
Congo 4 R.....	213.	Almost no reaction.
Rouge Congo 4 R.....		
Diamine red N O.....	225.	
Naphthylene red.....	240.	
Coralline.....		
Red coralline.....		
Aurine R.....	331.	Very slight reaction.
Paeonine.....		
Rhodamine G.....		
Rhodamine G extra.....	345.	If cold, no reaction.
Rhodamine B.....		
Rhodamine B extra.....		
Rhodamine O.....	346.	Little NaOH, if cold,
Rhodamine extra B.....		no reaction.
Safraniline.....		
Rhodamine 3 B.....	347.	No reaction, if cold.
Anisoline.....		

RED—Continued.

No REACTION—Continued.		No REACTION—Continued.	
Eosine A.....	} 354.	Erythrosine.....	} 359.
Eosine.....		Erythrosine D.....	
Eosine yellowish.....		Erythrosine B.....	
Eosine G extra.....		Pyrosine B.....	
Eosine G G F.....		Iodine eosine B.....	
Water soluble eosine.....		Rose B à l'eau.....	
Eosine 3 J.....		Primrose soluble.....	
Eosine 4 J extra.....		Eosine bluish.....	
Eosine extra.....		Eosine bleuâtre.....	
Eosine K S ord.....		Eosine J.....	
Eosine D H.....	} 361. To alcohol sol.	Dianthine B.....	} 362.
Eosine J J F.....		Cyanosine alcohol soluble.....	
Eosine B N.....		Cyklamine.....	
Methyl eosine.....		Rose bengale.....	
Safrosine.....		Rose bengale N.....	
Eosine scarlet B.....		Rose bengale A T.....	
Eosine B.....		Rose bengale G.....	
Ecarlate J.....		Bengal pink.....	
Ecarlate J J.....		Phloxine.....	
Ecarlate V.....		Phloxine iodine free.....	
Nopaline.....	} 367.	Phloxine T A.....	} 364.
Eosine scarlet B B extra.....		Eosine bleu.....	
Eosine B W.....		Cyanosine.....	
Kaiser red.....		Eosine 10 B.....	
Lutetienne.....		Rose bengale.....	
Eosine D H V.....		Rose bengale 3 B.....	
Erythrosine G.....		Azo carmine G in paste.....	
Dianthine G.....		Rosazine.....	
Pyro-lue J.....		Azo carmine B.....	
Iodine eosine G.....		Rosinduline 2 B bluish.....	
Jaune d'Orient.....	} 358.		

BLACK—Continued.

BLACK

On addition of H_2O to H_2SO_4 solution.

BLACK:

Phenylene black.....	152.	Greenish-black ppt.
Anthractene black B.....	153.	{ Green, then black ppt.
Naphthylamine black D.....	261.	Ppt.
Benzo gray.....	385.	{ Brownish sol. and black ppt.
Alizarine black S in paste.....	438.	Violet-black.
Alizarine black S W in paste.....		
Alizarine blue-black S W.....		
Naphthazarine S.....		
Fast black.....		
Fast blue-black in paste.....		
New gray.....		
Methylene gray O. N. D. N. F.....		
New methylene gray G. B.....		
Nigrisine.....		
Malta gray.....		
Gris direct J. B en poudre.....	502.	Reddish-gray.
Gris direct 4 R. R en pâte.....		
Gris spécial R en pâte.....		
Alsace gray.....		

BROWN:

Wool black.....	139.	{ Ppt., decomposes on boiling.
Noir pour laine.....		
Alizarine black S in paste.....	385.	{ Brownish sol. and black ppt.
Alizarine black S W in paste.....		
Alizarine blue-black S W.....		
Naphthazarine S.....		
Alizarine black P.....	401.	Light brown sol., on cooling brown ppt.
Alizarine Black S.....	402	Ppt.

VIOLET:

Naphthol black 6 B.....	154.	{ Green-blue, then violet ppt.
Naphthol black B.....	157.	{ Blue ppt., then red violet ppt.
Brilliant black B.....	159.	Ppt.
Diamond black.....	173.	Ppt.
Violet-black.....	438.	Black-violet.
Fast black.....		
Fast blue-black in paste.....	501.	Blue-violet.
Nigramine.....		

BLUE:

Jet black R.....	150.	Greenish-blue ppt.
Naphthol black 6 B.....	154.	{ Green - blue, then violet ppt.
Blue-black B.....	155.	Blue sol. and blue ppt.
Azo black O.....	157.	{ Blue ppt., then red-violet ppt.
Naphthol black B.....	167.	Ppt.
Brilliant black B.....	187.	Red-blue ppt.
Naphthol blue-black.....	197.	Gray-blue ppt.
Noir naphthol 12 B.....	224.	Gray-blue ppt.
Diamine black R O.....	238.	Ppt.
Direct gray B.....	239.	Red-blue ppt.
Diamine blue-black E.....	501.	Violet-blue.
Noir bien.....		
Diamine E.....		
Diamine black B O.....		
Noir Diamine B.....		
Nigramine.....		
Victoria black B.....	149.	{ On large dilution blue-red.
Victoria black G, 5 G.....	150.	Bluish-green ppt.
Jet black R.....	503	{ Dark-green ppt. of sulphate.
Aniline black.....		
Aniline black in paste.....		

VIOLET—Continued.

RED:		
Victoria black B.....	149.	Green, on large dilu- tion blue-red.
Victoria black G, 5 G.....		
New gray.....		
Methylene gray O, N D, N F.....		
New methylene gray G, B.....		
Nigrisine.....		
Malta gray.....	502.	Reddish-gray.
Gris direct J, B en poudre.....		
Gris direct 4 R, R en pâte.....		
Gris spécial R en pâte.....		
Alsaec gray.....		

BLUE:		
Jet black R.....	150.	Bluish-black ppt.
Blue black B.....		
Azo black O.....	155.	Ppt.
Naphthol blue black.....		
Noir naphthol 12 B.....	167.	Ppt.
Diamine black R O.....	187.	Ppt.
Direct gray R.....	197.	Dark-blue ppt.
Direct gray B.....	224.	Dark-blue ppt.
Diamine blue black E.....		
Noirblen.....	228.	Ppt.
Diamine E.....		
Diamine black B O.....	229.	Ppt.
Noir diamine B.....		
Fast black.....		
Fast blue black in paste.....	438.	Blue-black ppt.
New gray.....		
Methylene gray O, N D, N F.....		
New methylene gray G, B.....		
Nigrisine.....		
Malta gray.....		
Gris direct J, B en poudre.....		
Gris direct 4 R, R en pâte.....		
Gris spécial R en pâte.....		
Alsaec gray.....	502.	Gray-blue.

GREEN:

Noir vital.....		Ppt. (soluble in alkali- es) with evolution of H_2S .
Noir vital S.....	494.	

RED:

Victoria black B.....		
Victoria black G, 5 G.....	149.	Bordeaux red ppt.

BLACK.

On Addition of HCl to Water Solution.

BLACK:		
Jet black R.....	150.	Bluish-black ppt.
Naphthylamine black D.....	153.	Ppt.
Benzo gray.....	261.	Ppt.
Alizarine black S.....	402.	Ppt.
Fast black.....		
Fast blue-black in paste.....	438.	Blue-black ppt.
BROWN:		
Alizarine black S in paste.....		
Alizarine black S W in paste.....		
Alizarine blue black S W.....	385.	Brown-red.
Naphthazarine S.....		
Alizarine black P.....	401.	

VIOLET:

Wool black.....		
Noir pour laine.....	139.	Red-violet ppt.
Phenylene black.....		
Anthracite black B.....	152.	Deep violet ppt.
Naphthol black B.....		
Brilliant black B.....	157.	Red-violet ppt.

BLACK—Continued.

RED—Continued.	
Alizarine black S in paste.....	385.
Alizarine black S W in paste.....	Brown-red.
Alizarine blue-black S W.....	
Naphthazarine S.....	
No REACTION :	
Naphthol black 6 B.....	154.
Nigramine.....	501.
VIOLET—Continued.	
Violet black.....	173.
Diamine black R O.....	187.
Direct gray B.....	197.
Direct gray R.....	224.
Alizarine black S.....	402.
Nigramine.....	501.
BLUE :	
Naphthol black 6 B.....	154.
Blue-black B.....	155.
Azo black O.....	Ppt.
Naphthol black B.....	
Brilliant black B.....	157.
Diamond black.....	159.
Alizarine black S in paste.....	
Alizarine black S W in paste.....	385.
Alizarine blue-black S W.....	
Naphthazarine S.....	

BLACK.

On addition of NaOH to water solution.

BLACK :	
Naphthol black 6 B.....	154.
Fast black.....	438.
Fast blue-black in paste.....	Violet-black ppt.
NEW GRAY :	
Methylene gray O, N, D, N F.....	{ Gray-black ppt. of
New Methylene gray, G, D.....	{ the base, soluble in
Nigramine.....	{ benzole or ether;
Melita gray.....	{ with cherry-red
Gris direct J, B en poudre.....	{ color. On addition
Gris direct 4 R, R en pâte.....	{ of water or acetic
Gris special, R en pâte.....	{ acid blue-green sol.
Alsace gray.....	
VIOLET :	
Wool black.....	139.
Noir pour laine.....	Ppt.
Victoria black B.....	149.
Victoria black G, 5 G.....	Dark blue-violet.
Jet black R.....	150.
Phenylene black.....	Dark blue-violet.
Anthractite black B.....	152.
	Deep-violet ppt.

GREEN :	
Alizarine black P.....	401.
RED :	
Fast black B.....	386.
No REACTION :	
Naphthylamine black D.....	153.
Naphthol blue-black.....	167.
Noir naphthol 12 B.....	
Diamine blue-black E.....	228.
Noir bleu.....	
Diamine E.....	
Diamine black B O.....	229.
Noir diamine B.....	
Benzo gray.....	261.

(Or in soda sol.), if cold insoluble, on heating turning to violet-red.

PART X. — ALPHABETICAL LIST OF DYES, GIVING AGENT AND DYEING METHOD.

ABBREVIATIONS USED TO INDICATE THE DYE MAN- UFACTURERS AND THEIR AGENTS.

(A A C) American Color & Chemical Co., Albany, N. Y.
F. E. Atteaux & Co., 174-176 Purchase St., Boston, Mass.

(A) Actien-Gesellschaft für Anilinfabrikation, Berlin,
Germany. New York and Boston Dyewood Company, 55 Beek-
man St., New York.

(A C) Anchor Color Mfg. Co., 462 Cherry St., New York.

(A P M) Alex. P. Mende, 536-540 West Fourteenth St., New
York.

(A M) Actiengesellschaft für Chemische Industrie in Mann-
heim, Germany.

(At) F. E. Atteaux & Co., 174-176 Purchase St., Boston, Mass.

(B) Badische Anilin und Sodafabrik, Ludwigshafen am
Rhein, Germany. Pickhardt & Kuttroff, 128 Duane St., New
York.

(B A Co.) The British Alizarine Company, Ltd., Silvertown,
Victoria Docks, London, England. Beach & Co., Hartford, Ct.

(Bai) Bairstow & Co., 211 Pearl St., New York.

(B C F) Baseler Chemische Fabrik, Bindschedler, Basle,
Switzerland.

(Bch) Beach & Co., Hartford, Ct.

(Bd) J. A. & W. Bird & Co., 43 Cedar St., New York.

(B E) C. vom Bauer in Elberfeld, Germany.

(B K) Leipziger Anilinfabrik Beyer and Kegel, Leipzig,
Lindenau u. Fürstenberg-on-Oder, Germany.

(B L) Bosson & Lane, 36 Central Wharf, Boston, Mass.

(Bt) F. Brett & Co., 194 Fulton St., New York.

(Br S) Brooke, Simpson & Spiller, Ltd., Atlas Works, Hackney Wick, London, England. Beach & Co., Hartford, Ct.

(Bs) C. Bischoff & Co., 87-89 Park Place, New York

(By) Farbenfabriken vormals Fried. Bayer & Co., Elberfeld, Germany. Farbenfabriken, 40 Stone St., New York.

(C) Leopold Cassella & Co., Frankfort-on-Main, Germany. Wm. J. Matheson & Co., Ltd., 182-184 Front St., New York.

(C F G) Chemische Fabrik Griesheim, Frankfort-on-Main, Germany.

(Cl Co) The Clayton Aniline Company, Ltd., Clayton, Manchester, England. J. A. & W. Bird & Co., 43 Cedar St., New York.

(C J) Carl Jäger in Barmen, Barmen, Germany.

(C R) Claus & Reé, Droylsden, Manchester, England.

(C V) Colne Vale Chemical Co., Milnsbridge, near Huddersfield, England.

(Cz) John Casthelaz, Bruère & Co., Belbeuf, near Rouen, France.

(D) Farbenfabrik Dahl & Co., Barmen near Elberfeld, Germany. C. Bischoff & Co., 87-89 Park Place, New York.

(D H) L. Durand, Huguenin & Co., Basel, St. Fons and Hünningen, Germany. A. Klipstein Company, 122 Pearl St., New York.

(D W) L. Destree, A. Wiescher & Co., Haeren bei Brüssel, Belgium.

(E H) E. de Haën in List vor Hannover, Germany.

(E F W) Elton Fold Works, Bury, Lancashire, England. Beach & Co., Hartford, Ct.

(F) Farbwerk Friedrichsfeld, Dr. Paul Remy in Mannheim, Germany.

(Fi) Alfred Fischesser & Co., Lutterbach bei Mulhausen, Germany.

(F T M) Fabriques de Produit Chimiques de Thann et de Mulhouse, Alsace.

(G) Joh. Rud. Geigy & Co., Basel, Switzerland. John J. Keller & Co., 104-106 Murray St., New York.

(Gau) Gauhe & Co., Alizarinfabrik in Eitorf a. d. Sieg, Germany.

(Gb) Anilinfarbenwerk vorm. A. Gerber & Co., Basel, Switzerland.

(Gei.) Geisenheimer & Co., 189 Front St., New York.

ALPHABETICAL LIST OF DYES—ABBREVIATIONS. 241

(Gr.) Rob. Graesser, Chemical Works, near Ruabon, North Wales.

(H) Read Holliday & Sons, Ltd., Huddersfield, England.
Read Holliday & Sons, 100 William St., New York.

(H M) The Heller & Merz Co., Newark, N. J.

(H R W) Hudson River Aniline Color Works, Albany, N. Y.
Farbenfabriken of Elberfeld Co., 40 Stone St., New York.

(H S) The Hanna-Schöellkopf Co., 135 North Water St., Philadelphia.

(I) Gesellschaft für Chemische Industrie, Basel, Switzerland.
A. Klipstein & Co., 122 Pearl St., New York.

(Jb) J. B. Ibels, Chaussée de Mons, Brüssels, Belgium.

(J H) J. Hauff in Feuerbach, near Stuttgart, Germany.

(Jy) O. S. Janney & Co., 8-10 Letitia St., Philadelphia.

(K) Kalle & Co., Biebrich-on-Rhine, Germany. Kalle & Co.,
77 John St., New York.

(K B) Kuchler & Buff, Crefeld, Germany. F. Bredt & Co.,
194 Fulton St., New York.

(Kchl) Victor Koechl & Co., 122 Hudson St., New York.

(Kell.) John J. Keller & Co., 104-6 Murray St., New York.

(Ki) Kinzlberger & Co., Prague, Hungary.

(Klp) A. Klipstein & Co., 122 Pearl St., New York.

(L) Farbwerk Mühlheim vorm. A. Leonhardt & Co., Mühlheim-on-Main, Germany. Victor Koechl & Co., 122 Hudson St., New York.

(L D) Lepetit, Dollfus e Gansser, Susa, Milan, Italy. J. A. & W. Bird & Co., 43 Cedar St., New York.

(Lev) Levinstein Limited, Slackle and Crumpsall, Manchester, England.

(L M) Leeds Mfg. Co., Brooklyn, N. Y.

(Lo) Charles Lowe & Co., Stockport, England.

(L P) Lucien Picard & Co., St. Fons, Lyons, France.

(L Sch) Lembach & Schleicher, Biebrich-on-Rhine, Germany.

(M) Farbwerke vorm. Meister Lucius & Brüning, Höchst-on-Main, Germany. Victor Koechl & Co., 122 Hudson St., New York.

(Math) Wm. J. Matheson & Co., Ltd., 182-184 Front St., New York.

(M Ly) Manufacture Lyonnaise des Matières Colorantes, La Mouche, near Lyons, France. Wm. J. Matheson & Co., Ltd., 182-184 Front St., New York.

- (Mo) Gillard P. Monnet & Cartier, St. Fons, Lyons, France.
- (N) Carl Neuhaus, Elberfeld, Germany. A. Klipstein & Co., 122 Pearl St., New York.
- (N Y & B) New York and Boston Dyewood Co., 55 Beekman St., New York.
- (N I) Farbwerke Griesheim, W. Noetzel, Istel & Co., Griesheim-on-Main, Germany.
- (O) K. Oehler, Anilin u. Anilinfarbenfabrik, Offenbach-on-Main, Germany. Geisenheimer & Co., 189 Front St., New York.
- (P) Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, France. Sykes & Street, 85 Water St., New York.
- (P) St. Denis Dyestuff & Chemical Co. (A. Poirrier), Paris, France. Sykes & Street, 85 Water St., New York.
- (P C) Theodor Peters, Chemnitz, Germany.
- (P K) Pickhardt & Kuttroff, 128 Duane St., New York.
- (P L) Pick, Lange & Co., Amersfoort, Holland.
- (P S) Ferd. Petersen & Co., Schweizerhalle, Basel, Switzerland.
- (R) Joh. Conr. Reihlen, Friedensau, Neuhausen, Germany.
- (R D) Roberts, Dale & Co., Manchester and Warrington, England.
- (R E) Dr. Remy & Co., Weissenthurm-on-Rhine, Germany. Fr. Schroeder, 100 William St., New York.
- (R F) J. Ruch et Fils, Pantin (Seine), maison à Paris, France.
- (Rh) Société Chimique des Usines du Rhone, France. Beach & Co., Hartford, Ct.
- (S) Chemische Fabrik vorm. Sandoz & Co., Basel, Switzerland.
- (S B) A. Sevoz & Boasson, Lyon-Vaise, France.
- (S M) The Stamford Mfg. Co., 133-137 Front St., New York.
- (Sch) The Schoellkopf Aniline and Chemical Co., Buffalo, N. Y., 100 William St., New York.
- (S S) Sykes & Street, 85 Water St., New York.
- (S W) The Stone & Ware Co., 157 Maiden Lane, New York.
- (T) W. G. Thompson & Co., Middleton.
- (tM) Chemische Fabriken vorm. Weiler-ter Meer, Uerdingen, Germany.
- (V) Verein Chemischer Fabriken in Mannheim, Germany.

The Roessler & Hasslacher Chemical Co., 100 William St., New York.

(W) Williams Brothers, Hounslow, Middlesex, England.

(W C B) W. C. Bearnès & Co., Ltd., Hackney Wick, London, England. Wm. J. Matheson & Co., Ltd., 182-184 Front St., New York.

(Z) Friedrich K. Zimmer, Mannheim, Germany.

DYEING METHODS.

The dyeing formulæ used throughout are referred to by number. This is done to save space, and leaves the dyeing formulæ all in one place.

For the reason that the records are meagre and faulty, this list is not offered except E. & O. E. The authorities vary and the processes themselves alter and improve. We will thank any one for the courtesy of corrections and additions.

WOOL.

1. Neutral bath, as magenta, methyl violet, etc., begin at 40° Centigrade, and after bringing to a boil very slowly, add afterward 1 per cent. acetic acid, to brighten the color.

2. Neutral bath, as diamin fast red, sulfonazurine. Dyed with 15 per cent. Glauber salts, with the least possible amount of water.

2a. Colors dyed with 3 per cent. acetic acid, viz., lanacyl blue.

3. Colors dyed in an acid bath, as acid fuchsin, ponceau, fast red, with 15 per cent. of Glauber salts. Commence 70° Centigrade, add slowly 5 per cent. sulphuric acid, previously diluted with water.

3a. Ten per cent. Glauber salts; enter hot; add 2 per cent. bisulphate; after fifteen minutes, 8 per cent. of bisulphate.

3b. Dye with Glauber salts, sulphuric acid and chrome afterward.

4. Chrome mordant. Boil an hour and a half with 3 per cent. bichrome and $2\frac{1}{2}$ per cent. tartar. Tartar is often replaced by $1\frac{1}{2}$ per cent. of sulphuric acid, or sodium bisulphate, or oxalic acid. Acetic acid may aid in exhausting the bath.

4a. Mordant with $1\frac{1}{2}$ per cent bichrome, 3 per cent. lactic acid of 50° Beaumé, and 1 per cent. sulphuric acid.

5. Chrome mordant with fluorchrome. Boil an hour and a half in a wooden vat with 4 per cent. fluorchrome and 1 per cent. oxalic acid.

6. Mordant dyes. Dissolve the dyes in water containing 10 per cent. of acetic acid. Enter the goods at 50° Centigrade, carry to a boil, after half an hour add slowly 2 per cent. of bichrome and 2 per cent. of tartar in solution; boil again three-quarters of an hour.

6a. Six per cent. copperas, 3 per cent. cream of tartar, 1 per cent. oxalic acid.

6b. For colors that dye on an alum mordant. Mordant the wool with 12 per cent. alum and 7 per cent. cream of tartar.

SILK.

Process 7. Dyes which are put on in a neutral bath slightly acidified with acetic acid, as magenta, methyl violet, etc.—For every 5 kilos of silk used take 120 liters of water, 20 liters of soap solution with acetic acid up to a slightly acid reaction. Enter at 85° Centigrade; wash after dyeing and vivify with about 20° c.c. of acetic acid in 120 liters of water. Dry without washing. The soap solution is the soap solution used in boiling out the silk, to which is added one-third of its weight of a pure Kern soap. German dyers added to this soap solution 20 kilograms of Marseilles soap, 200 grams of gelatine, 10 grams of common salt in every 100 liters of water. French dyers use starch paste instead of gelatine.

Process 8. Dyes which are used in an acid bath as fast red, ponceau, naphthol yellow S, etc.—For every 5 kilos of the dye use 120 liters of water, and 30 liters of the soap solution. Wash and vivify with about 10 c.c. of sulphuric acid in 120 liters of water.

Process 9. Chrome Mordant.—In chrome chloride or 20° Beaumé leave the silk for twelve hours at 40°. Wash well and dry out in the centrifugals. Pass into a water-glass solution of 1° Beaumé and turn five times. Dye in the soap solution, to which acetic acid has been added. Wash, boil in a soap solution containing 5 gm. of Kern soap, wash, and vivify with lukewarm water with acetic acid.

Process 10. Alum Mordant.—Take 100 gm. of iron-free alum, 40 gm. of hyposulphite of soda (Na_2SO_2) in a liter of water, one hour at 40° Centigrade, one hour at 60°, and one hour at 80°. Wash and dye in a soap solution which has been slightly acidified with acetic acid in the same way as in Process 9a.

Process 10b.—Sixty gm. of iron-free alum, 6 gm. of soda crystals, 1 liter of water; precipitate which is formed first is redissolved, turn four or five times, and give twelve hours. Put on the centrifugals, then in water-glass solution of 1° Beaumé, wash carefully, and dye. The dye-bath should receive 20 liters of soap solution for every 100 liters of water, and the bath should be slightly acidified with acetic acid, after which it is dyed as in process 9a.

COTTON AND LINEN.

Process 11, Adapted for magenta, methylene blue, etc.—Mordant in 5 per cent. tannin, calculated on the weight of the goods, using very little water, enter at 50° or 60° Centigrade, let it stand for six hours; place in the centrifugals, and then enter into a bath of 20 per cent. tartar emetic at 30° Centigrade for fifteen or twenty minutes; lift, and wash thoroughly.

Process 12. Direct dyeing substantive dyes, as chrysamine, chrysophenine, diamine blacks, etc.—Dye with 3 per cent. of soap, 20 per cent. of common salt or Glauber salts. Wash and dry. Hard water must absolutely be avoided. Phosphate of soda is used in the dye-bath; also soda, or potash, or water-glass.

Process 12a.—Forty per cent. of salt and 2 to 5 per cent. of soda-ash.

Process 12b.—Forty per cent. of Glauber salts and 2 to 5 per cent. of soda ash.

Process 12c.—Glauber salts

Process 12d.—Glauber salts and soap.

Process 12e.—Use soap alone.

Process 12f.—Use salt only.

Process 12g.—Alum and Glauber salts.

Process 13. Chrome Mordant.—Allow to stand twelve hours in the chrome mordant of the Höchst Dye Works, then wring, and place for half an hour in a solution of 30 gm. of soda-ash per liter at 60° Centigrade. Wash well.

Process 14.—Turkey red oil, sumac, alum, chalk.

Process 15.—Diazotize and couple with

- a. Alpha-naphthol.
- b. Beta-naphthol.
- c. M-phenylene-diamine.
- d. Toluylene diamine hydrochloride.
- e. Diamine hydrochloride.
- f. Diazotized benzidin.
- g. Diazotized paranitraniline.
- h. Dye with 15 to 20 per cent. Glauber or common salt, and then pass into diazotized azophor red, etc.
- i. Resorcin.
- j. Amido-naphthol ether.
- k. Nitrazol.

Process 16.—Ten per cent. sulphuricinate of soda, with 0.2 per cent. stannate of soda; dry and enter into acetate of alum of 5° Beaumé. Dry at 40° to 50° Centigrade. Dye with 1 per cent. acetic acid.

Process 17.—For dyes that dye on aluminum mordanted cotton or linen, prepare the mordanting solution the following way: 1 liter. of water, 200 gm. of normal aluminum sulphate, 31.82 gm. of sodium carbonate (Na_2CO_3); make the solution to stand at 10° Twaddle (sp. gr. 1.05). Impregnate the cotton with this solution; remove excess of liquid by squeezing or wringing; dry at a low temperature, and pass into cold H_2O containing 50 gm. of strong commercial ammonia liquor (0.88 sp. gr.) per liter. Work in this solution for ten minutes and wash well.

If soap be the fixing agent employed, use a solution containing 10 gm. per liter.

If arsenate or phosphate of soda, use from 5 to 10 gm. per liter.

If silicate of soda at 100° Twaddle, use 5 to 10 gm. per liter.

ALPHABETICAL LIST OF DYES.

Name of Dye.	Agent.	Method.
Acetine Blue	B	
Acetinduline R solution	M	
Acid Alizarine Blue BB and GR	M	3
Acid Alizarine Green B and G	M	3
Acid Black B	AC	3
Acid Black B, No. 4	AC	3
Acid Black No. 77	AC	3
Acid Black No. 5,534	H	3
Acid Black No. 5,535	H	3
Acid Black S	H	
Acid Blue A A	G	3
Acid Blue 6 G	C	3
Acid Blue 100	Sch	3
Acid Brown	D	3
Acid Brown G	A	
Acid Brown R	A	
Acid Carmoisine B	B K	3
Acid Cerise	M, P, P S	
Acid Fuchsine	D, F, L	3-8
Acid Green	By, D H, F, O	3-8
Acid Green	By, F, O, tM	
Acid Green bluish	N I	3-8
Acid Green D	M	
Acid Green extra conc.	C	3-8
Acid Green M	M	3-8
Acid Green 3 B	By	3
Acid Green B, 2 B, 3 B, 4 B	S S	3
Acid Green J	S S	3
Acid Green J E E E	P	3
Acid Grenadine	G	3
Acid Grenadine B	G	3
Acid Indigo Blue	Sch	3
Acid Magenta	B, P S, S S	
Acid and Milling Scarlet	Br S	3
Acid Methyl Violet S 7 B	P K	3
Acid Naphthol Orange		3
Acid Orange	G	3-8
Acid Ponceau		
Acid Rosamine A	M	3-8
Acid Rubin (see Fuchsine S)		3-8
Acid Rubin S B	P K	3
Acid Ruby	I	2
Acid Violet 2 B	B	
Acid Violet 2 B	G	3
Acid Violet 3 B N	B	

Name of Dye.	Agent.	Method.
Acid Violet 3 B extra.....	By	3
Acid Violet 4 B extra.....	By	3
Acid Violet 4 B N.....	B, I	3
Acid Violet 4 B X.....	By	3
Acid Violet 5 B.....	S S	3
Acid Violet 5 B F.....	M	3
Acid Violet 6 B.....	G	3
Acid Violet 6 B.....	By	3
Acid Violet 6 B.....	A	3
Acid Violet 6 B N.....	B, I	3-8
Acid Violet 7 B.....	L	3
Acid Violet 7 B.....	B, J	3-8
Acid Violet N.....	M	3
Acid Violet R extra.....	By	3
Acid Violet 2 R extra.....		
Acid Violet 3 R extra.....	By	3
Acid Violet 4 R.....	B	
Acid Violet 4 R S.....	M	3
Acid Yellow.....	A, F, P, P S, R F	
Acid Yellow D.....	A	3
Acid Yellow G.....		
Acid Yellow R S.....	D	3
Acid Yellow S (see Naphthol Yellow S).....		
Acid Yellow, 8,822.....	H	3
Acridine Orange.....	L, S B	11-7
Acridine Orange G.....	Bs	11
Acridine Orange N O.....	L	
Acridine Orange R extra.....	L, S B	11
Acridine Red B, B B, 3 B.....	L, S B	
Acridine Scarlet R, 2 R, 3 R.....	L	
Acridine Yellow.....	L, S B	7-11
Aethyl Blue B F.....	M	
Aethylene Blue.....	O	11
Aethyl Eosine.....		
Aethyl Green.....	K B	3-8-11
Aethyl Green.....	A	3-8-11
Aethyl Violet.....	B, I	3-8-11
Akme Yellow.....	L	3-8
Alcohol Blue.....	B, Br S, By, C R, D, K L, L, R D	
Alcohol Blue S F C.....	K	
Alcohol Eosine.....	tM	
Alcohol Soluble Eosine.....	tM	
Alcohol Yellow G.....	K, C R	
Alcohol Yellow R.....	K	
Aldazine Pink B.....	I	2
Aldehyde Green.....		
Alizarine Black.....	M	12
Alizarine Black 4 B.....	C	3
Alizarine Black 6 B.....	C	3
Alizarine Black 6 B O.....	C	3
Alizarine Black D R.....	M	

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Alizarine Black R, patented.....	Bs	4
Alizarine Black R, patented.....	C M	3
Alizarine Black R T.....	L	12
Alizarine Black S.....	B	4
Alizarine Black S, patented.....	C	4
Alizarine Black S, in paste.....	B	4
Alizarine Black S R A.....	B	4
Alizarine Black S W, in paste.....	B	4
Alizarine Black T, patented.....	C	
Alizarine Blue.....	A P M	4
Alizarine Blue in paste.....	B, M	4—9
Alizarine Blue A.....	M	4
Alizarine Blue A B.....	B A Co	4
Alizarine Blue B.....	A P M	4
Alizarine Blue B R 3 G.....	By	3—4
Alizarine Blue C G.....	By	4
Alizarine Blue C R.....	By	4
Alizarine Blue C S.....	C	4
Alizarine Blue D B.....	M	12
Alizarine Blue D G.....	L	4—12
Alizarine Blue D N W.....	M	
Alizarine Blue D R 8.....	M	
Alizarine Blue G B.....	A C	4
Alizarine Blue G S.....	At	4
Alizarine Blue G W.....	By	
Alizarine Blue J G.....	Sch	4
Alizarine Blue N.....	P K	4
Alizarine Blue N A extra.....	P K	4
Alizarine Blue N B.....	P K	4
Alizarine Blue N G patented.....	P K	4
Alizarine Blue N G G powder.....	P K	4
Alizarine Blue O D R.....	At	
Alizarine Blue R.....	By, M	4—9
Alizarine Blue R R.....	M	
Alizarine Blue S powder.....	B, By, M	4
Alizarine Blue S paste.....	B, By, M	4
Alizarine Blue soluble powder A B S.....	B A Co	4
Alizarine Blue S A P.....	By	3—4
Alizarine Blue S C A.....	A C	4
Alizarine 1,400 T.....	C	3
Alizarine Blue Black S W.....	B	
Alizarine Bordeaux B in paste 20%.....	By	4
Alizarine Bordeaux B D in paste.....	By	4
Alizarine Bordeaux C.....	A P M	4
Alizarine Bordeaux G.....	By	
Alizarine Bordeaux G G.....	By	
Alizarine Brown.....	B, By	
Alizarine Brown in powder.....	M	13
Alizarine Brown in paste.....	M	13
Alizarine Brown A S.....	D H	
Alizarine Brown G N.....	By	4

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Name of Dye.	Agent.	Method.
Alizarine Brown O D R.....	At	4
Alizarine Brown R.....	A P M	4
Alizarine Brown R B.....	By	4
Alizarine Brown S O.....	P K	4
Alizarine Cardinal	By	6b
Alizarine Carmine	B A Co	4
Alizarine Carmine Blue B and G.....	By	4
Alizarine C A.....	B A Co	4
Alizarine Cyanine G in paste.....	By	4
Alizarine Cyanine Black G in paste.....	By	4
Alizarine Cyanine R in paste.....	By	4
Alizarine Cyanine R A extra.....	By	4
Alizarine Cyanine 2 R.....	By	4
Alizarine Cyanine 3 R.....	By	4
Alizarine Dark Blue.....	B	4
Alizarine Dark Blue S	Kchl	4
Alizarine Fast Red	C	3
Alizarine for Violet	Gau	4—6b
Alizarine G D.....	B	
Alizarine G I	B	17b
Alizarine Green B	D	4
Alizarine Green C	By	4
Alizarine Green C E paste	By	4
Alizarine Green C G.....	By	4
Alizarine Green C K.....	By	4
Alizarine Green E B	Bs	4
Alizarine Green G	D	4
Alizarine Green, paste	P K	4
Alizarine Green S in paste.....	B	4
Alizarine Grenat R	M	6b
Alizarine Indigo S in paste.....	B	4
Alizarine Lanacyl Blue B B.....	C	2a
Alizarine Lanacyl Blue 3 B.....	C	2a
Alizarine Lanacyl Navy Blue B patented.....	C	2a
Alizarine Lanacyl Blue R.....	C	2a
Alizarine Lanacyl Violet B, patented.....	C	2a
Alizarine Maroon paste	B	6b
Alizarine No. 1	N	4
Alizarine No. 1 B.....	M	4—6b
Alizarine No. 6.....	M	6b
Alizarine No. 10	N	6b
Alizarine Olive O D.....	At	4
Alizarine Orange	Gau	
Alizarine Orange A in paste.....	B	6b
Alizarine Orange A O.....	B A Co	6b
Alizarine Orange A O P.....	B A Co	6b
Alizarine Orange G	By, M	6b
Alizarine Orange N	M	6b
Alizarine Orange powder	M	4—6b
Alizarine Orange R.....	By	6b
Alizarine P	B A Co	

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Alizarine Powder S A	B A Co	4-6b
Alizarine Powder W	By	4-6b
Alizarine Red		4
Alizarine Red S	B	6b
Alizarine R G	B	17
Alizarine R X	M	4
Alizarine Saphirol	By	3
Alizarine Saphirol B	By	3-4
Alizarine S C	B A Co	17
Alizarine Scarlet, patented	C	3
Alizarine S D G	M	17b
Alizarine S X	B, N	17b
Alizarine S X extra	By	17b
Alizarine VI	B 4-6a-6b-17	4-9-17
Alizarine Violet		4
Alizarine Violet extra	At	4
Alizarine Violet paste	S M	4
Alizarine Violet, 1007 T	C	4
Alizarine Viridine paste	By	4
Alizarine W S powder	M	4-6b
Alizarine X	By	17a
Alizarine Yellow	A P M	4
Alizarine Yellow A paste	B	17
Alizarine Yellow A W	B	4
Alizarine Yellow C paste	B	17
Alizarine Yellow F S	D H	4
Alizarine Yellow G G	M	4
Alizarine Yellow G G W powder	M	4
Alizarine Yellow L W	P K	4
Alizarine Yellow O D	At	4
Alizarine Yellow paste	M	4
Alizarine Yellow R	By, C R, M	4
Alizarine Yellow R W powder	M	4
Alkali Blue...A, B, Br S, By, C, C R, D, D H, F, G, J, K, L, Lev, M, N I, O, P, P S, Sch, tM,		
Alkali Blue 6B		
Alkali Blue D	A	
Alkali Blue X G	Br S	
Alkali Brown	D	12
Alkali Brown R	L P	12
Alkali Green	Br S	
Alkali Red	D	
Alkali Violet	B, I	2-3
Alkali Violet R	By	
Alkali Yellow	D	
Alkali Yellow R	D	
Alpha-Naphthol Orange		
Alpine Bleu	G	3
Alsace Gray	Fi	
Alsace Green	F T M	
Alsace Green J	F T M	

Name of Dye.	Agent.	Method.
Amaranth	B K, C, F, Lev, M, M Ly, P, R D	
Amaranth extra	P	3
Amethyst Violet	K	
Anil Blue R.....	Fi	
Aniline		
Aniline Brown		3—11
Aniline Green		
Aniline Orange		
Aniline Pink		11
Aniline Purple		
Aniline Red	K B	3—8—11
Aniline Violet		
Aniline Yellow	D H	
Aniline Yellow extra.....	C	12
Anisidine Ponceau		
Anisoline	Mo	3—8—11
Anisol Red		
Anthracene Acid Black L W.....	C	3
Anthracene Acid Black S F.....	C	3
Anthracene Acid Black S T.....	C	3
Anthracene Acid Brown B.....	C	3—4—5
Anthracene Acid Brown G.....	C	3—4—5
Anthracene Acid Brown N.....	C	3—4—5
Anthracene Acid Brown R.....	C	3—4—5
Anthracene Acid Brown S W patented.....	C	3
Anthracene Black		
Anthracene Blue S.....		4
Anthracene Blue S W X.....	B	
Anthracene Blue W B.....	B	6b
Anthracene Blue W G.....	B	
Anthracene Blue W R.....	B	4
Anthracene Brown paste.....	B, B A Co, By	13
Anthracene Brown G paste.....	By	13
Anthracene Brown R paste.....	By	13
Anthracene Croceïne B, G.....	F	
Anthracene Dark Blue.....	B	
Anthracene Green (see Coeruleïne).....		4—9—13
Anthracene Red.....	J, By	3—4
Anthracene Red B.....	Sch	3
Anthracene Scarlet O R.....	Sch	3
Anthracene Violet		4—9—13
Anthracene Yellow paste.....	By	4
Anthracene Yellow B N.....	C	4
Anthracene Yellow C.....	C	3—4—5
Anthracene Yellow G G.....	C	4
Anthracene Yellow R.....	C	4
Anthracite Black B.....	C	3
Anthragalol (see Anthracene Brown).....	C	13
Anthramine Yellow	At	4
Apollo Red	G	3
Archil Red 3 V N.....	S S	3

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Arnica Yellow	G	12
Arsen Fuchsine		3-8-11
Atlas Orange	Br S	3-8
Atlas Red	Br S	
Atlas Scarlet	By	3
Auramine G	B, G, I	2-7-11
Auramine O, I, II, conc.	B, G, I	2-7-11
Arabian Black	Bai	12b
Aurantia	x.....A	8
Aureoline	D H	12-12b
Aureosine		
Aurine	Gr, Lo, L P, Mo, R D	
Aurine R		
Aurotine	Cl Co	6b
Azaleine		
Azaline		
Azamine 4 B (see Benzo Purpurine 4 B).		
Azarine R	M	8
Azarine S	M	8
Azin Blue alcohol soluble.....	D	
Azindon Blue G, R.....	K	
Azin Green G B.....	L	11
Azin Green S.....	L	3
Azin Scarlet G conc.....	M	7-11
Azo Acid Black B.....	M	3
Azo Acid Black G.....	M	3
Azo Acid Black R.....	M	3
Azo Acid Blue B.....	M	3
Azo Acid Blue 4 B.....	By	3
Azo Acid Brown	By	3
Azo Acid Fuchsine. B.....	M	3
Azo Acid Fuchsine G.....	M	3
Azo Acid Ruby.....	D	3
Azo Acid Ruby 2 B.....	D, B K	3
Azo Acid Violet 4 R.....	By	3
Azo Acid Yellow.....	A	3-8
Azo Black O.....	M	3
Azo Black-Blue	O	12b
Azo Blue	A, By, L, Lev	12e
Azo Bordeaux	By	3
Azo Bordeaux	O	
Azo Brown O.....	M	3
Azo Brown Y.....	S S	3
Azo Carmine B.....	B	3
Azo Carmine G paste.....	B	3
Azo Cardinal G.....	A	
Azo Chromine	G	4
Azo Coccine 7 B (see Cloth Red G..By).....	A	
Azo Coccine G (see Tropaeoline 0000).		
Azo Coccine 2 R.....	A	3
Azo Cochineal	By	3

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Name of Dye.	Agent.	Method.
Azo Coralline	D	3
Azo Corinth	O	12e
Azo Crimson L.....	By	3
Azo Crimson S.....	By	3
Azo Diphenyl Blue.....		
Azo Eosine	By	3
Azo Flavine	B, D, tM	3—8
Azo Fuchsine Acide	R F	4
Azo Fuchsine B.....	By	3
Azo Fuchsine G.....	By	3
Azo Fuchsine G N.....	By	3
Azo Fuchsine S.....	By	3
Azo Galleine	G	4
Azo Green	By	4
Azo Grenadine S.....	By	3
Azo Mauve B.....	O	12e
Azo Mauve R.....	O	12e
Azo Orange R.....	D H	12
Azo Orseille R.....	A	
Azo Orseiline	A, By	
Azo Orcelleine	O, B	
Azophenine Blue G.....	N J	
Azophenine Blue R.....	N J	
Azophor Black S Printing.....	M	
Azophor Blue D	M	15b
Azophor Orange Printing	M	15b
Azophor Red P N	M	15b
Azorccine		
Azo Red A.....	C	
Azo Ruby	tM, Lev	3
Azo Ruby A.....	C	3
Azo Ruby S.....	A	3
Azo Ruby 2 S.....	A	
Azo Saffranine	G	3
Azo Turkey Red	O	
Azo Violet	A, By, L, Lev	12e
Azo Yellow	B K, I, K, M	3—8
Azo Yellow M.....	D H	3—8
Azo Benzol Fast Crimson.....	P K	12
Azuline		
Azurine		
Basle Blue	D II	2—11
Basle Blue B B.....	D H	
Basle Blue R paste.....	D H	
Basle Blue S.....	D H	3—8
Bavarian Blue alcohol soluble.....	A	
Bavarian Blue D B F.....	A	7—11
Bavarian Blue D S F.....	A	
Bengal Blue	K, P	
Bengal Pink	C I, D H	3

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Bengaline Blue B	K	11
Benzal Green	O	11
Benzidine Blue		
Benzidine Red		
Benzindamine	N J	
Benzo Azurine G.....	A, By, L, Lev	12e
Benzo Azurine 3 G.....	A, By, L	12e
Benzo Azurine R	By	12
Benzo Black	By	12
Benzo Black Blue G.....	By	12
Benzo Black Blue 5 G.....	By	12
Benzo Black Blue R.....	By	12e
Benzo Black Brown.....	By	12
Benzo Blue B B.....	By	12
Benzo Blue 3 B	By	12
Benzo Blue B X.....	By	12b
Benzo Brown B.....	By	12
Benzo Brown G.....	By	12
Benzo Brown 5 R.....	By	12
Benzo Chrome Black Blue	By	12
Benzo Chrome Black B.....	By	12
Benzo Chrome Black Blue B	By	12
Benzo Chrome Brown B	By	12
Benzo Chrome Brown 5 G.....	By	12b
Benzo Chrome Brown 3 R.....	By	12
Benzo Cyanine B.....	By	
Benzo Cyanine 3 B.....	By	
Benzo Cyanine R.....	By	
Benzo Dark Brown	By	
Benzo Fast Gray	By	
Benzo Flavine	O	9-11
Benzo Flavine No. 2.....	O	9-11
Benzo Gray	By	12
Benzo Green G	By	12
Benzo Indigo Blue	By	12
Benzo Nitrol Brown G and 2 R.....	By	12b
Benzo Nitrol Brown N	By	12
Benzo Olive	By	12
Benzo Orange R	A, By, L	4-12
Benzo Pure Blue	C	12b
Benzo Purpurine B	A, By, L, Lev	12e
Benzo Purpurine 4 B.....	A, By, L, Lev	12e
Benzo Purpurine 6 B.....	A, By, L, Lev	12e
Benzo Purpurine 10 B	A, By, L, Lev	12e
Benzo Sky Blue	By	12
Benzoyl Green		
Benzyl Violet	B K, C R, K B, R E, tM	3-8-11
Best Magenta Crystals	K B	
Best Violet (Brilliant India Dye)	K B	
Biebrich Acid Blue	K	3
Biebrich Acid Blue G patented	K	3

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Name of Dye.	Agent.	Method.
Biebrich Acid Blue G G.....	K	3
Biebrich Alizarine Black 4 B N patented.....	K	3
Biebrich Patent Black A N.....	K	3
Biebrich Patent Black 4 A N.....	K	3
Biebrich Patent Black A O.....	K	3
Biebrich Patent Black 4 B N.....	K	3
Biebrich Patent Black R O.....	K	3
Biebrich Patent Jet Black.....	K	3a
Biebrich Patent Jet Black 3 B O.....	K	3
Biebrich Scarlet.....	K	3
Bismarck Brown....A, B, C R, F, K, N J, O, P S, R F	tM, W	3—11
Bismarck Brown.....	tM	3—11
Bismarck Brown-Yellow Shade.....	C	11
Bismarck Brown B.....	J	11
Bismarck Brown G.....	D H	3—11
Bismarck Brown T.....	D H	3—11
Bitter Almond Oil Green.....	K B	3—8—11
Blackley Blue.....	Lev	8—11
Bleu alcalin.....	M Ly	
Bleu alcalin 4 B.....	Jb	
Bleu alcalin B V S Ia No. 57.....	Jb	
Bleu belge.....	Jb	11
Bleu brillant Diamine G.....	M Ly	
Bleu Chromazone.....	G	3—4
Bleu Coupier à l'alcool.....	S B	
Bleu de Bengale.....	K	11
Bleu de ciel à l'alcool.....	Jb	
Bleu de ciel alcalin.....	Jb	6b
Bleu de ciel soluble.....	Jb	8—11
Bleu de Lyons.....	M	3—8—11
Bleu de nuit.....		
Bleu de Paris.....		
Bleu Diamine B B.....	M Ly	
Bleu Diamine B B B.....	M Ly	
Bleu Diamine B X.....	M Ly	
Bleu Diamine 3 R.....	M Ly	
Bleu Diamine R W.....	M Ly	
Bleu direct.....		
Bleu en pâte.....	N J	
Bleu fluorescent.....	I, S	
Bleu glacier.....	I	3—8—11
Bleu lumière.....	P	
Bleu Marin.....	P	3—11
Bleu métaphénylène B.....	M Ly	
Bleu méthyl.....	M Ly	8—11
Bleu méthylène nouveau N.....	M Ly	
Bleu méthylène nouveau N G G.....	M Ly	
Bleu neutre.....	M Ly	
Bleu noir Diamine B.....	M Ly	
Bleu noir Diphenyle.....	G	12

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Bleu solide R, 3 R.....	M Ly	
Bleu soluble pur.....	D W, L, M Ly	8--11
Bleu nouveau Diamine G.....	M Ly	
Bleu nouveau Diamine R.....	M Ly	
Bleu nouveau Diamine P.....	M Ly	
Bleu opale	M Ly	
Bleu pour coton G.....		
Bleu pour impression.....	M Ly	
Bleu pur à l'alcool.....		
Bleu pur Diamine	M Ly	
Bleu pur Diamine F F	M Ly	
Blue asozin	P	3
Blue alcohol soluble	M	
Blue B J B	P	3
Blue Black B	B	3
Blue Black No. 1	Bai	
Blue Black No. 2	Bai	
Blue Black 5534	H	3
Blue B S	C, P	3
Blue 3 B S	P	3
Blue C B alcohol soluble	D H	
Blue C B water soluble	D H	
Blue extra	R D	7--11
Blue Green S	B	
Blue 77 G	A C	12f
Blue Rougeant P P W Printing	M	
Blue water soluble for wool and silk	N J	8--11
Bordeaux B	A, B K, Lev, L P, M, R F	3--8
Bordeaux B L	C	3--8
Bordeaux B X	By	3
Bordeaux C O V	A	3--12f
Bordeaux D H	D H	3--8
Bordeaux Diamine B	M Ly	3--8
Bordeaux Diamine S	M Ly	3--8
Bordeaux extra	By	3--12f
Bordeaux G	D	3--8
Bordeaux G	By	3
Bordeaux R extra	M	3--8
Bordeaux S	A, R F	3--8
Bottle Green	Bch	12
Brazeline	At	4
Brexaline	At	4
Brahma Orange	Z	
Brahma Red B, B B.....	Z	
Brahma Red 6 B	Z	
Bright Yellow T	B, L	12
Brilliant Alizarine Blue D paste	By	4
Brilliant Alizarine Blue, G, R	By	4--9--13
Brilliant Alizarine Blue D paste	By	
Brilliant Alizarine Cyamine G, 3 G	By	
Brilliant Azurine B.....	A, By	12

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Name of Dye.	Agent.	Method.
Brilliant Azurine 5 G	A, By, L	12
Brilliant Black B	B	3
Brilliant Blue	D	
Brilliant Bordeaux S	A	3
Brilliant Carmoisine O	M	
Brilliant Cochineal 2 R	C	
Brilliant Cochineal 4 R	C	
Brilliant Chrome Red paste	By	
Brilliant Congo G	A, By, L	12e
Brilliant Congo R	A, By, L, R F	12e
Brilliant Cotton Blue greenish	By	11
Brilliant Croceine	By	3—8—12
Brilliant Croceine bluish	M	
Brilliant Croceine 3 B	By	
Brilliant Croceine 9 B	C	3
Brilliant Croceine M	C	
Brilliant Cyanine Blue R	By	4
Brilliant Diazine Blue B	K	
Brilliant Diazine Blue B B	K	
Brilliant Geranine B patented	By	12
Brilliant Geranine 3 B	By	
Brilliant Green..B, By, C, C J, C R, D H, F, K, K B, M, M Ly, N I, O, P S, R E, tM		3—8—11
Brilliant Green crystals	Kohl	3
Brilliant India Dye		
Brilliant Opaline	Gb	
Brilliant Orange G	M	3
Brilliant Orange G	A	
Brilliant Orange O	M	3
Brilliant Orange R	M	3
Brilliant Orcelleine, patented	C	3
Brilliant Orseille C	C	
Brilliant Ponceau G	B K, C, Lev	3
Brilliant Ponceau G G	C	3—8
Brilliant Ponceau 4 R	By	
Brilliant Ponceau 5 R	By, C, D	3
Brilliant Purpurine	A	
Brilliant Purpurine R	A, By, L	3
Brilliant Purpurine 5 B	R F	
Brilliant Red	Sch	3
Brilliant Red D	I	3
Brilliant Red Congo G	A, By, L	3
Brilliant Red 2038 T	C	12
Brilliant Saffranine G	A	11
Brilliant Scarlet	Lev	3
Brilliant Scarlet 6 R	C	3
Brilliant Sulfon Azurine R	By	
Brilliant Yellow	Sch	3
Brilliant Yellow	tM	3—8
Brilliant Yellow	A, By, L, S B	12e
Brilliant Yellow S	B	3—8

Name of Dye.	Agent.	Method.
Bronze Diamine G	M Ly	12—15
Brun au chrome	G	
Brun Bismarck No. 259	M Ly	
Brun Bismarck E E	M Ly	
Brun Congo G	R F	12
Brun Corinthe B	R F	12e
Brun Corinthe G	R F	12e
Brun Diamine R	M Ly	12 & 15e
Brun Diamine 3 G	M Ly	12 & 15e
Brun Diamine M	M Ly	12 & 15e
Brun Diamine V	M Ly	12 & 15
Brun Diphényle	G	
Brun Mikado B	L, S B	12f
Brun Mikado 3 G O	L, S B	12f
Brun Mikado M	L, S B	12f
Brun Naphtine α	P	
Brun Naphtine β	P	4
Brun P M	Mo	
Brown B B X	Br S	12
Brown J E	P	2
Brown J E E E	P	3
Brown N	P	3
Brown S D M	S S	12
Brown S D P	S S	12
Buffalo Rubin	Sch	3
Butter Yellow		
Cachou de Laval	P	15
Cachou de Laval S	P	15
Cachou Diamine	M Ly	12
Campanuline	A	11
Canarine	D H	
Cannelle		3—11
Capri Blue G N	By, L	11
Capri Green B	L	11
Capri Green G	L	
Capri Green G G	L	
Carbazol Yellow	B	12b
Carbazol Yellow W	B	12
Cardinal		
Cardinal Red S		
Carminenaphte	D H	
Carminenaphte J	D H	
Carminenaphte Grenat	D H	
Carmoisine	A, B, By, SS	3
Carmoisine conc.	A, K, S S	3
Carnotine	Cl O	12—12b
Caroubier	D H	
Catechu Brown F K		
Catechu Brown F D K		
Catechu Brown G K		

Name of Dye.	Agent.	Method.
Catechu 2 G K		
Cattu Italiano	L D	15
Celeste Blue B		
Cerasine	D H	
Cerasine Orange G	C	
Cerasine Red	C	
Cerise	B, C, D H, K B, P, P S, N J	
Cerotine Orange C extra	C J	
Cettonine		3
Chicago Blue B	A	
Chicago Blue 4 B	A	
Chicago Blue 6 B	A	
Chicago Blue R	A	
Chicago Blue 2 R	A	
Chicago Blue 4 R	A	
Chicago Blue R W	A	
Chicago Gray	G	
Chicago Orange	G	
China Blue	A, Br S, By, P N, L	8—11
China Green Crystals	K B	
Chinoline Blue	G	
Chinoline Green	B	
Chinoline Red	A	
Chinoline Yellow	A, B, By, R F	3—8
Chinoline Yellow alcohol soluble	A, B, By, R F	
Chloramine Brown C	By	12
Chloramine Orange	By	
Chloramine Yellow	By	
Chlorhydrate of Toluidine	O	17
Chlorophenine G	Cl Co	
Chlorophenine Orange A A	Cl Co	2
Chlorophenine Orange R	Cl Co	2
Chlorophenine R	Cl Co	3—7—12
Chlorophenine Y	Cl Co	3—7—12
Chromazone Red	G	3
Chromanil Brown G G	A	12
Chromanil Brown R	A	12
Chromanil Black R F	A	
Chrome Blue	By	4
Chrome Blue 2 B	G	4
Chrome Blue 4 B	G	4
Chrome Blue B N	G	4
Chrome Blue No. 470	G	4
Chrome Blue P E	G	4
Chrome Blue R	G	4
Chrome Blue 2 R	G	4
Chrome Blue 3 R	G	4
Chrome Bordeaux	By	4
Chrome Brown G	G	4
Chrome Brown R O	M	3
Chrome Fast Black B	A	3

Name of Dye.	Agent.	Method.
Chrome Fast Yellow G	A	
Chrome Fast Yellow 2 G	A	
Chrome Fast Yellow R	A	
Chrome Green	By	4
Chrome Orange	By	4
Chrome Prune	By	4
Chrome Red paste	By	4
Chrome Ruby Paste	By	4
Chrome Violet	By	
Chrome Violet powder	By, G	4
Chrome Violet paste	By	4
Chrome Yellow	N I	
Chrome Yellow D	By	4
Chrome Yellow P	G	4
Chromine G	K	12
Chromogene I	M	3b
Chromotrope 2 B	M	3b
Chromotrope 6 B	M	3b
Chromotrope 8 B	M	3b
Chromotrope 10 B	M	3b
Chromotrope F B	M	3b
Chromotrope 2 R	M	3
Chromotrope S	M	3b
Chromotrope S N	M	3b
Chromotrope S R	M	3b
Chrysamine	By	12
Chrysamine G	A, By, L, Lev	12e
Chrysamine G G	By	12
Chrysamine R	A, By, L, Lev	12e
Chrysaniline		
Chrysaureine		
Chryseoline		
Chrysoidine cryst	M	2a—7—11
Chrysoidine ..A, B, By, C R, C V, F, K, P S, R D, T,	tM, W	1—7—11
Chrysoidine G	D H, G	1—7—11
Chrysoidine J	I	1—7—11
Chrysoidine R	C, M Ly	1—7—11
Chrysoidine R	G, I, Lev	
Chrysoidine R	D H	11
Chrysoidine Y	Lev	1—7—11
Chrysoidine C E E		
Chrysoine	P	3
Chrysoine	B, B K, D H, G, M, L P, P, tM	
Chrysoline	Mo	
Chrysophenine	A, By, L, S B	12e
Chrysophenine G	Kchl	12
Cinereine	P	
Cinnabar Scarlet	B K	
Cinnamine S	W	
Cinnamon Brown	P S	3—11

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Name of Dye.	Agent.	Method.
Citronine	D H, Fi, I, O, P, S B	3
Citronine	Fi, S B	3—8
Citronine	Br S	
Citronine A	L	
Citronine A	C	3—8
Citronine 2 A extra	S S	7
Citronine A H E	P	3
Citronine N E	P	3
Clayton Aurotine	Cl O	4
Clayton Carnotine	Cl O	3
Clayton Cloth Red	Cl O	3—8
Clayton Red	Cl O	3
Clayton Yellow	Cl O	12e
Clematine	G	11
Cloth Brown reddish	By, L	4
Cloth Brown yellowish	By, L	4
Cloth Orange	By, L	4
Cloth Red	M	4
Cloth Red B	By, D	4
Cloth Red B	O	4
Cloth Red B A	A	4
Cloth Red 3 B extra	By	4—9
Cloth Red G	By	
Cloth Red G	O	4
Cloth Red G extra	By	4
Cloth Red 3 G extra	By	4
Cloth Red G A	A	4
Cloth Red 3 G A	A	4
Cloth Red O		4
Cloth Red O B	O	3
Cloth Red O B, F R B O	O	3
Cloth Red R	D	3
Cloth Scarlet G	K	3
Cloth Scarlet R	K	3
Coccein 3 B	P	3
Coccein 3 B G		3
Coccinin	M	
Coccinin B	M	3
Cochenille brillant 2 R	M Ly	
Cochenille brillant 4 R	M Ly	
Cochineal Red A	B	3
Cochineal Scarlet G	Sch	3
Cochineal Scarlet P S	By	
Cochineal Scarlet 2 R	Sch	3
Cochineal Scarlet 4 R	Sch	3
Cochineal Substitute	I	
Coeruleine paste	B, By, D H, F	4—9—13
Coeruleine A paste	M	4
Coeruleine B paste	M	4
Coeruleine B W paste	M	4
Coeruleine S powder or paste	B, By, D H, Fi, M	4—9—13

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Coeruleine S W powder or paste.....	By	4—9—13
Columbia Black B	A	
Columbia Black B B	A	
Columbia Black F B	A	2a
Columbia Black R	A	
Columbia Blue G	A	
Columbia Blue R	A	
Columbia Brown R	A	12
Columbia Chrome Black B B	A	2a
Columbia Fast Blue 2 G	A	
Columbia Green	A	
Columbia Red 8 B	A	
Columbia Yellow	A	
Congo	A, By, L, Lev	1—12
Congo B	P	
Congo Blue 3 B	A	12
Congo Blue B X	A	12b
Congo Blue 2 B X	A	12
Congo Blue 2 B	A, By	12
Congo Brown G	A, Lev	12
Congo Brown R	A Lev	12
Congo Corinth B	A, By, L, Lev	12e
Congo Corinth G	A, By, L, Lev	12e
Congo Fast Blue B	A	
Congo Fast Blue R	A	
Congo G R	A, By	12e
Congo Orange R	A, By, L, R F	12
Congo Orange G	A	
Congo P	A	
Congo Pure Blue	A	12b
Congo 4 R	A, By, L	12e
Congo Red	I	12—12f
Congo Ruby	A	
Congo Violet	A	3—12f
Congo Yellow en pâte	A, By	
Coralline	L P	
Coralline (red)		
Coralline (yellow)		
Coreïne	D H	4
Coreïne A B	D H	4
Coreïne A R	D H	4
Coreïne R R	D II	4
Cotton Black B	B	12b
Cotton Blue	L, N J	
Cotton Blue	D	8—11
Cotton Blue 3 B	G	12g
Cotton Blue 6 B extra	G	8—11
Cotton Blue G		12g
Cotton Blue R	B, P	11
Cotton Bordeaux	B	
Cotton Brown 3 G, R	Cl Co	

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Name of Dye.	Agent.	Method.
Cotton Brown	B	
Cotton Brown N	C	12
Cotton Brown R	B	4
Cotton Orange G	B	12
Cotton Orange R	B	12
Cotton Ponceau	B K	
Cotton Red	B	12
Cotton Red 4 B	B	12e
Cotton Scarlet	B	3—8—17b
Cotton Scarlet 3 B conc	K	
Cotton Yellow G	B	12
Cotton Yellow G B	B	12
Cotton Yellow R	B	12b
Coupiers Blue		
Cresotine Yellow G	A, By, O	12
Cresotine Yellow R	A, By, O	12
Cresyl Blue B B	L	
Cresyl Blue 6B	Bs	11
Cresyl Blue B B S O	Bs	11
Cresyl Blue R R	Bs	11
Cresyl Fast Violet B, B B	L	
Croceïne A Z	C	
Croceïne B	Sch	3
Croceïne 3 B	Sch	3—8
Croceïne 3 B X	By, K	3
Croceïne brillante M	M Ly	
Croceïne Orange	By, B K, K, Lev, R F,	3
Croceïne Scarlet 3 B	By, K	3—12g
Croceïne Scarlet 4 B X	K	3
Croceïne Scarlet 7 B	By, R F	3
Croceïne Scarlet 8 B	By, K	3
Croceïne Scarlet 10 B	By	3
Croceïne Scarlet O extra	K	3—8
Cross Dye Black	H	12a
Cross Dye Drab	H	12a
Crow Black	B, L	12
Crumpsall Direct Fast Brown B	Lev	12
Crumpsall Direct Fast Brown M	Lev	12
Crumpsall Direct Fast Brown O	Lev	12
Crumpsall Fast Yellow Y Y F D	Lev	3
Crumpsall Yellow	Lev	3—4
Crystal Ponceau	A, B	3
Crystal Ponceau 6 R	C, M, M Ly	3
Crystal Violet	B	3—8—11
Crystal Violet 5 B O	I	3—8—11
Crystal Violet O	B	3—8—11
Cumassi Black	Lev	3c
Cumassi Mauve Blue	Lev	3c
Cumidine Ponceau	A, B	3
Cumidine Red	A, B	3
Curcumeïne	A, B K	3

Name of Dye.	Agent.	Method.
Curcumine	G	3—8
Curcumine S	A, By, L, S B	3—8—14
Curcumine Substitute	P	3
Curcuphenine	Cl O	2
Cutch Brown D	N	2a—7—11
Cutch Brown G G	Br	12b
Cyanine		
Cyanine B	M	3
Cyanol extra	C, M Ly	3
Cyanosine	D H	
Cyanosine alcohol soluble	K, M	
Cyklamine	Mo	2—7
Dahlia		3—8—11
Dark Blue	B, L	3
Dark Brown M	M	2a—7—11
Dark Green	B	6d
Dark Green 682	Br S	12
Deep Wool Black 2 B	A	2
Deep Wool Black 3 B	A	2
Delphin Blue	S	
Delta Purpurine 5 B	By, Lev	12e
Delta Purpurine 7 B	A, L, Lev, By	12e
Delta Purpurine G	By	12e
Diamant Gros Cristaux	M Ly	
Diamine Azo Black B patented	C	12a
Diamine Azo Blue No. 5,154 patented	C	
Diamine Azo Blue No. 72,122 patented	C	3—12e
Diamine Azo Blue R patented	C	12e
Diamine Azo Blue R R patented	C	12e
Diamine Black B	C	15
Diamine Black B H	C	15
Diamine Black B O	C	15
Diamine Black H W	C	15
Diamine Black R O	C	15
Diamine Black-Blue B	C	
Diamine Blue B	C	12 or 15
Diamine Blue B B	C, M Ly	12—15
Diamine Blue 3 B	C, M Ly	12—15
Diamine Blue B G patented	C	
Diamine Blue B X	C, M Ly	12
Diamine Blue N C	C	12b
Diamine Blue 3 R	C, M Ly	12—15
Diamine Blue R W	C	12—15
Diamine Blue S R X patented	C	12
Diamine Blue No. 50 patented	C	
Diamine Blue No. 52 patented	C	
Diamine Blue No. 53 patented	C	
Diamine Blue No. 55 patented	C	
Diamine Blue 72,918	C	12
Diamine Blue Black E	C, M Ly	12—15

Name of Dye.	Agent.	Method.
Diamine Blue Black R	C	12—15
Diamine Bordeaux B	C	
Diamine Bordeaux S	C	
Diamine Brilliant Blue G	C	12
Diamine Bronze C	C	12—15e
Diamine Bronze G	C, M Ly	12—15
Diamine Brown A	C	12—15e
Diamine Brown B	C	12—15e
Diamine Brown 3 G	C	12—15e
Diamine Brown M	C	12—15e
Diamine Brown V	C, M Ly	12—15
Diamine Brown Q Q	C	12—15e
Diamine Brown 3,833	C	12—15e
Diamine Brown No. 30a patented	C	
Diamine Brown No. 31 patented	C	
Diamine Brown No. 32 patented	C	
Diamine Brown No. 33 patented	C	
Diamine Brown No. 34 patented	C	
Diamine Brown No. 35 patented	C	
Diamine Brown No. 36 patented	C	
Diamine Brown No. 37 patented	C	
Diamine Brown 2 O patented	C	
Diamine Catechine B patented	C	12—15
Diamine Catechine G patented	C	12—15
Diamine Catechu	C	12
Diamine Dark Blue B	C	12
Diamine Deep Black Cr patented	C	12a
Diamine Deep Black 0000	C	12—15
Diamine Deep Black R B	C	12—15
Diamine Deep Black S S	C	12—15
Diamine Deep Dark Blue B and R	C	12c
Diamine Fast Brown G	C	12
Diamine Fast Red	C	3—12
Diamine Fast Red F	C, M Ly	3
Diamine Fast Yellow A	C	12f
Diamine Fast Yellow B	C	12b
Diamine Fast Yellow R	C	12
Diamine Flavine R	By	12
Diamine Gold	C	12
Diamine Gold Yellow	C, M Ly	12a
Diamine Gray G	C	12
Diamine Green B	C, M Ly	12
Diamine Green G	C	12
Diamine New Blue G	C	12
Diamine New Blue R	C	12
Diamine Nitrazol Black B	C	12
Diamine Nitrazol Brown B patented	C	12—15
Diamine Nitrazol Brown B D patented	C	12—15
Diamine Nitrazol Brown G patented	C	12—15
Diamine Nitrazol Brown R D patented	C	12—15
Diaminogene B	C, M Ly	12

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Name of Dye.	Agent.	Method.
Diaminogene extra	C, M Ly	
Diaminogene B R.....	C	
Diaminogene Blue B B	C	12
Diaminogene Blue G	C	12
Diamineral Black B	C	12
Diamineral Blue R patented	C	12b
Diamine Orange B	C	12
Diamine Orange D	C	12
Diamine Orange G	C	12
Diamine Orange G C	C	12
Diamine Pink B D, B extra	C	12
Diamine Pure Blue	C, M Ly	12b
Diamine Pure Blue F F	C	
Diamine Red B	C	12e
Diamine Red 3 B.....	C	12e
Diamine Red 10 B	C	12
Diamine Red N O	C, M Ly	12a
Diamine Scarlet B.....	C	3—8
Diamine Scarlet 3 B	C	3—8
Diamine Sky Blue	C	12
Diamine Sky Blue F F	C	12
Diamine Steel Blue L	C	12a
Diamine Violet N	C	12
Diamine W O	C	12
Diamine Yellow N	C	12
Diamine Yellow paste.....	C	12
Diamine Yellow R paste.....	C	12
Diamond Black	By	4
Diamond Brilliant Blue G	C	
Diamond Brown	By	
Diamond Fast Acid Black	A P M	12
Diamond Fast Blue	A P M	12
Diamond Fast Red	A P M	12
Diamond Fast Yellow	A P M	12
Diamond Flavine G	By	4
Diamond Green	By	4
Diamond Green	Mo	11
Diamond Green B	B	3—8—11
Diamond Green G	B	3—8—11
Diamond Green crystals	K B	
Diamond Orange paste	By	
Diamond Yellow G paste.....	By	4
Diamond Yellow R paste.....	By	4
Dianil Black	M	4
Dianil Black G paste.....	M	4
Dianil Black R paste	M	4
Dianil Blue B.....	M	4
Dianil Blue G.....	M	4
Dianil Blue R.....	M	4
Dianil Blue Black E.....	M	4
Dianisidine Blue	By, M	

Name of Dye.	Agent.	Method.
Dianol Black-Brown	Lev	
Dianol Brilliant Red extra	Lev	
Dianol Brown N B	Lev	
Dianol Brown R	Lev	
Dianol Brown Y	Lev	
Dianol Brown Y Y	Lev	
Dianol Olive	Lev	
Dianthine	Br S	12b
Dianthine G		3
Dianthine B		17
Diazine Black	K	11
Diazine Blue B	K	11
Diazine Blue 2 B	K	11
Diazine Blue B R	K	11
Diazine Brown	K	11
Diazine Green	K	11
Diazo Black	G	12
Diazo Black B	By	
Diazo Black B H N	By	
Diazo Black 3 B	By	
Diazo Black G	By	
Diazo Black R	By	
Diazo Blue	By	
Diazo Blue B	By	3
Diazo Blue-Black R S	By	
Diazo Bordeaux	By	
Diazo Brilliant Black B	By	
Diazo Brilliant Black R	By	
Diazo Brown G	By	
Diazo Brown R extra	By	
Diazo Brown V	By	
Diazo Deep Blue B B	By	15b
Diazo Deep Blue 3 B	By	15b
Diazo Indigo Blue B	By	3
Diazo Navy Blue 3 B	By	12-15a
Diazot Alizarine Red R N	Bai	3
Diazo Fast Black	M	
Diazo Fast Black H	By	
Diazurine B	By	12
Diazurine G	By	12
Dimethyl Orange		3-8
Dimethylaniline Orange		3-8
Dingley Yellow 17	Sch	12
Dinitrosoresorcin		
Dioxine	L	6
Diphenylamine Blue		8-11
Diphenylamine Blue alcohol soluble	D H	
Diphenylamine Orange		3
Diphenyl Black R	G	12
Diphenyl Blue D B B	G	12
Diphenyl Blue E R F	G	12

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Diphenyl Blue E F S	G	12
Diphenyl Blue N T	G	12
Diphenyl Blue Black	G	12
Diphenyl Brown	G	12
Diphenyl Brown B	G	12
Diphenyl Brown R	G	12
Diphenyl Brown R R	G	12
Diphenyl citronine G	G	12c
Diphenyl Fast Black	G	12
Diphenyl Fast Yellow G	G	12
Diphenyl Indigo Blue	G	12
Diphenyl Orange	G	12
Diphenyl Red	G	12
Diphenyl Violet R	G	12
Diphenyl Yellow	G	12
Direct Black B	S S	12
Direct Black B F G	A	12
Direct Black G B N	I	12
Direct Black K	I	12b
Direct Black R	S S	12
Direct Black X	Bs	12
Direct Blue	M	
Direct Blue 5093	S W	12
Direct Blue B	I	12
Direct Blue B	K	
Direct Blue 2 B	S S	12
Direct Blue 3 B X	K	
Direct Blue 5 B	S S	12
Direct Blue G	Sch	12
Direct Blue G 97	Sch	12
Direct Blue O	B L	12
Direct Blue R	I	12
Direct Blue 2 R	S S	12
Direct Blue Black B	By	
Direct Brown 5,092	S W	12
Direct Brown B B	Bs	12
Direct Brown G G	By	12
Direct Brown G X	Bs	12
Direct Brown J	I	12
Direct Brown M	S S	12
Direct Brown N X	Bs	12b
Direct Brown R	G	12
Direct Brown S	G	12
Direct Brown S D P	S S	12
Direct Brown V X	Bs	12b
Direct Brown 130	Sch	3
Direct Brown 131	Sch	3
Direct Catechu Brown	N J	
Direct Deep Black E extra	By	12
Direct Deep Black R	By	12b
Direct Deep Black R W	By	12

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Name of Dye.	Agent.	Method.
Direct Deep Black T	By	
Direct Fast Brown B	By	12
Direct Fast Brown G G	By	3
Direct Gray	M	
Direct Gray B	I	12
Direct Gray R	I	12
Direct Gray Reddish	N J	
Direct Green	I	12b
Direct Green B	S S	12
Direct Green B C	S W	12
Direct Green B X	B L	12
Direct Green Y	I	3
Direct Green Y Y C	S W	12
Direct Indigo Blue A	I	12b
Direct Indigo Blue B K	I	12b
Direct Lemon Yellow	I	12
Direct Orange	Fi	
Direct Orange G 69	Sch	12
Direct Orange R	S S	12
Direct Orange 2 R	K	8—12f
Direct Orange Y	S S	12
Direct Oriol Yellow	G	12
Direct Red	A, By	12
Direct Red	G	
Direct Red	Fi	
Direct Red B	Bs	12b
Direct Red E T	G	12
Direct Red No. 55	Sch	12b
Direct Scarlet B conc.	K	12f
Direct Scarlet G	K	12f
Direct Scarlet R	K	12f
Direct Union Black	Jy	12
Direct Yellow	Fi	
Direct Yellow	A, By	
Direct Yellow	K	12f
Direct Yellow	S S	3
Direct Yellow C	S S	12
Direct Yellow G	K	12f
Direct Yellow 2 G	K	12f
Direct Yellow 3 G	K	12f
Direct Yellow R	By	12
Direct Yellow T	I	3
Double Brilliant Scarlet G	A, Lev	3
Double Brilliant Scarlet 3 R	By	3
Double Green S F	K	
Double Ponceau 2 R	By	3
Double Ponceau 3 R	By	3
Double Ponceau 4 R	By	3
Double Scarlet	K	3
Double Scarlet extra S	A, Lev	3
Double Scarlet G	tM	3

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Double Scarlet R	Lev	3
Double Scarlet 2 R	tM	3
Eboli Blue	Bs	2—12
Eboli Blue B	L	12f
Eboli Green B	L	12c
Ecarlate B	P	3
Ecarlate brillante	R F	3
Ecarlate Crocéine 3 B	R F	3
Ecarlate d'Eosine B	M Ly	3—8
Ecarlate Diamine B	M Ly	2—3—7
Ecarlate Diamine 3 B	M Ly	2—3—7
Ecarlate J	Mo	3—7
Ecarlate J J	Mo	3—7
Ecarlate V	Mo	3—7
Echurine	L M	
Eclipse Red		12e
Emerald Green crystals	By, K B	3—7—11
Emin Red	A	3
Empire Orange G	Bch	12
English Brown		3—11
Eosamine B	A	
Eosine	C J, F	3—8
Eosine A	B	3—8
Eosine B	L	3—8
Eosine B B	I	
Eosine 10 B	C, M Ly	
Eosine B N	B	3—8
Eosine B W		3—8
Eosine bleu	S	
Eosine bleuâtre		3—17b
Eosine bluish	G	3—8—12f
Eosine D H	D H	3—8—12f
Eosine D H V	D H	3—8—12f
Eosine extra	M	
Eosine G extra	tM	
Eosine G G F	C	3—8
Eosine J	B	3—17
Eosine 3 J	L	3—8
Eosine 4 J extra	L	3—8
Eosine J J F	M Ly	3—8
Eosine K S ord.	S	3—8
Eosine S	B	
Eosine Scarlet B	C	3—8
Eosine Scarlet B B extra	G, M	3—8—12f
Eosine alcohol soluble	tM	
Eosine alcohol soluble	M	
Eosine water soluble	M	3—8
Eosine yellowish	A, Br S, K	3—8
Erie Blue G G	A	
Erika B	A, RF	3—12

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Name of Dye.	Agent.	Method.
Erika G	Lev	
Erika 4 G N	A	12b
Eriocyanine	G	3
Erioglaucine	G	3
Erythrine X	B	8
Erythrobenzine		
Erythrosine	B, Br S, C J, D H, F, M, tM	3—11
Erythrosine A	P K	3
Erythrosine B	A	
Erythrosine B B	A	
Erythrosine D	C, M Ly	
Erythrosine G	B	
Erythrine X	B	3—8
Essaine		
Ethyl Purple 6 B	P K	3
Eupitton Acid		
Excelsior Lake Scarlet J N	C	3
Excelsior Black	C	3
Extra Superfine (fine) Brilliant Green Crystals	K B	
Fast Acid Blue B	By	
Fast Acid Blue R	M	3—8
Fast Acid Fuchsine B	By	
Fast Acid Green B	C	
Fast Acid Green B S	C	3
Fast Acid Green B Z	C	12
Fast Acid Ponceau	D H, S	
Fast Acid Red A	M	
Fast Acid Red B	B, L	3
Fast Acid Scarlet	D H, S	
Fast Acid Violet A 2 R	M	3
Fast Acid Violet B	M	3—8
Fast Acid Violet 10 B	By	3
Fast Acid Violet R	M	
Fast Azo Granat	M	
Fast Black	L	11
Fast Black B	B	12b
Fast Black B S	B	
Fast Blue	Br S	3
Fast Blue B	A, B, M, tM	3
Fast Blue 2 B for Cotton	A, P, S	11
Fast Blue 6 B for Wool	A	
Fast Blue alcohol soluble	A, B K	
Fast Blue for Cotton	N J	
Fast Blue greenish	B	3
Fast Blue Black paste	L	11
Fast Blue Black M paste	L	11
Fast Blue G	Bdt	4
Fast Blue R	A, B, B K, C, M, tM	2
Fast Blue 3 R	C	3
Fast Blue R for Cotton, in crystals	A	11

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Fast Blue III R	S	11
Fast Bordeaux O	M	4
Fast Brown	By	3
Fast Brown 3 B	A	3
Fast Brown G	A tM, R F	3
Fast Brown N	B	3
Fast Brown O N T yellowish	M, R F	3—8
Fast Brown R	B L	12
Fast Brown 25	A, C	3
Fast Claret	I	3
Fast Cotton Blue B	M	11
Fast Cotton Blue R	M	11
Fast Cotton Blue R R	M	11
Fast Cotton Blue 3 R crystals	M	11
Fast Cotton Brown R	G	12
Fast Cotton Orange 6 R extra	Bs	12
Fast Cotton Yellow 6 G extra	Bs	12
Fast Cotton Yellow O	Bs	12
Fast Cotton Yellow R	Bs	12
Fast Direct Blue B	Bdt	12
Fast Direct Blue G	Bs	12
Fast Direct Brown B B	Bs	12
Fast Direct Brown G	Bs	12
Fast Fulling Blue R R	I	4
Fast Green		6a
Fast Green	N J	3—8—11
Fast Green	By	3
Fast Green extra	By	3
Fast Green extra bluish	By	3
Fast Green B	C	
Fast Green M	D H	
Fast Indigo Blue R	K	3
Fast Light Green	By	3
Fast Mordant Yellow G	B	11
Fast Navy Blue	O	11
Fast Navy Blue G M, R M	K	11
Fast Navy Blue M M, R M	K	11
Fast Neutral Violet B	C, M Ly	11
Fast New Blue for Cotton	D H	11
Fast Pink for Silk		
Fast Ponceau B	B	3
Fast Ponceau 2 B	B	3
Fast Red	A, D H, Lev	3
Fast Red	F, L	3
Fast Red A	A, B, B K, By, C R, K, Lev, tM	3
Fast Red B	B, B K	3—8
Fast Red B	N J	
Fast Red B T	By, D H, Lev	3
Fast Red C	B	3
Fast Red D	B	3—8
Fast Red E	B, By, B K	3

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Name of Dye.	Agent.	Method.
Fast Red E B	B	3—8
Fast Red 7 B	N J	
Fast Red N S	By	3—8
Fast Red O	M	3
Fast Red R	A C	3
Fast Red R Y	B K	3
Fast Red S	M, tM	3
Fast Scarlet		12e
Fast Scarlet	K	3
Fast Scarlet B	K	3—8
Fast Silk Gray O	M	
Fast Silk Red cf. Fast Red 7 B	N J	
Fast Violet	D H	
Fast Violet bluish	By	3
Fast Violet reddish	By	3
Fast Yellow	B, By, L P, M Ly, S B	
Fast Yellow	Br S	
Fast Yellow	B	3—8
Fast Yellow	tM	3
Fast Yellow G	B K, D H, K	
Fast Yellow greenish	D	
Fast Yellow R	B K, K	3—8
Fast Yellow S	C	
Fast Yellow 4 S	S S	3
Fat Ponceau	M, K	
Fine Blue (see Aniline Blue alcohol soluble).		
Fine New Green Crystals	K B	
Fine Violet	K B	
Firn Blue	I	3—8—11
Flavaniline	M	
Flavaniline S	M	
Flavaurine		
Flavazol	A	3
Flaveosine		
Flavinduline	B	11
Flavophenine		
Fluoresceine	C, D H, L	3—8
Fluorescent I, II, III, IV	H	
Fluorescent Blue	I, S	
Fluorindine		
Fond Rouge	Cz	
Formyl Violet 4 B	C	3
Formyl Violet 6 B	C	3
Formyl Violet 8 B patented	C	3
Formyl Violet 10 B	C	3
Formyl Violet S 4 B	C, M Ly	3
Formyl Violet S 5 B	C	3a
Fuchsia	I	11
Fuchsiacine		
Fuchsine. B, By, C, D, D H, L, K, K B, M, N J, O, P S		2—8—11
Fuchsine A	P	2

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Fuch sine acide	D H, R F	
Fuch sine B O O	P	2
Fuch sine J O O	P	2
Fuch sine S	B, D S, P S	2—8
Fuch sine Scarlet		
Fulling Blue	K	4
Fulling Blue G	G	3
Fulling Blue R	G	3
Fulling Green	D	
Fulling Green S	Kehl	1
Fulling Red B	At	
Fulling Red B	C	
Fulling Red F G G	C	
Fulling Red F R	C	
Fulling Red G	C	
Fulling Red R	D	
Fulling Yellow	D, Lev	4
Fulling Yellow O O	C	
Gallamine Blue	G, By	4
Gallamine Blue paste		
Gallanil Green	D H	4
Gallanil Indigo P	D H	4
Gallanil Indigo P S	D H	4
Gallazin A	D H	4
Gallein paste	B, By, D H, Fi	4—9—13
Gallein A paste	M	4
Gallein W powder	M	4
Gallocyanine B S	D H	4—13
Gallocyanine D H	D H	4—13
Gallocyanine paste D	H	3
Gallocyanine paste	By	4
Galloflavine in paste	B	4—13
Gambine	A, K	6a
Gambine B	H	4—6a
Gambine G paste	H	6a
Gambine R paste	H	6a
Gambine Y paste	H	6a
Gambine Y D S	H	6a
Gambine Yellow	H	6a
Ganahl Yellow = Martius Yellow	B K	3
Gentian Blue 6 R	A	
Gentianin	G	11
Genuine Violet	K B	
Geranium	C	11
Geranium G N	C	3
Geranine B B	By	
Geranine G	By	
Germania Red		
Giroflé	D H	11
Giroflé in paste and powder	D H	

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Name of Dye.	Agent.	Method.
Gladioline		
Gloria Black B patented	C	3d
Glycine Blue	Ki	
Glycine Corinth	Ki	12e
Glycine Red	Ki	12e
Gold Brown		3—11
Golden Yellow	H	3
Gold Orange		3—11
Gold Orange	B K, By, D	3—8
Gold Orange for Cotton	D H, tM	
Gold Yellow	By	3—8
Granat Brown		
Gray R & B	I	
Greenish Blue		
Green Powder = Methyl Green		7
Grenadine	N J, P S	
Grenat S	B	
Grenat soluble		
Gris Diamine G = Diamine Gray G [C]	M Ly	12
Gris direct B en poudre	P	11
Gris direct J en poudre	P	11
Gris direct R en pâte	P	11
Gris direct 4 R en pâte	P	11
Gris Diphényle	G	
Gris spécial R en pâte	P	11
Guinea Green B	A	3—8
Guinea Green B V	A	3—8
Guinea Red 4 R	A	3
Guinea Violet 4 B	A	3
Half Wool Black	C	
Half Wool Black S	C	
Harmaline		
Havana Blue W.	A C	12f
Helianthine	B	3—8
Helianthine	G	3—8
Heligoland Blue B	N J	
Heligoland Blue G	N J	
Heligoland Blue R	N J	
Heligoland Blue G A	Jy	12
Heligoland Blue 2 R	Jy	12
Heligoland Brown	N J	
Heligoland Yellow	N J	12
Heligoland Red	N J	
Heliochrysine		
Heliotrope	A, By, L	2—12
Heliotrope au tannin	M Ly	
Heliotrope B	A, By, L	12e
Heliotrope B	K	11
Heliotrope 2 B	A, By, L	12
Heliotrope 2 B	K	11

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Heliotrope 2 B	A	
Helioxanthine = Diphenylamine Orange		3
Helvetia Blue	G	3—11
Helvetia Green	Bi	
Hessian Blue	L	
Hessian Bordeaux	L, S B	12
Hessian Brilliant Purple	A, By, L, S B	12
Hessian Brown B B	L	11
Hessian Brown M M	L	12
Hessian Purple B	A, By, L, S B	12e
Hessian Purple D	A, By, L, S B	12e
Hessian Purple N	A, By, L, S B	12e
Hessian Violet	A, By, L, S B	12e
Hessian Yellow	A, By, L	12e
Hoechst New Blue	M	3
Hofmann's Violet	K B	3—8—11
Hofmann's Violet N	P	11
Homophosphine G	L	11
Hydroleine	R E	
Hydroleine Induline	R E	
Hydroleine Marine R	R E	
Hydroleine Primula B	R E	
Immedial Black V extra patented	C	12
Imperial Black	At	3
Imperial Green Crystals	K B	
Imperial Red Violet		3
Imperial Scarlet	By	3
Imperial Violet Crystals	At	3
Indamine Blue N B		12
Indamine Gray	N J	
Indamine 3 R	N J	11
Indamine 6 R	N J	11
Indamine T D	N J	
Indazine M	C, M Ly	11
Indazurine	B C F	
Indian Yellow	By	3—8
Indian Yellow G	C	
Indian Yellow R	C	12
Indigene D, F	By	
Indigo Blue N	C	3
Indigo Blue R B	S S	3
Indigo Blue S G N	C	3
Indigo Powder 1,006	H	3
Indigo Salt	K	
Indisine		
Indochronine T	C	4
Iodoine Blue	B	
Indol Blue R	A	11
Indophenine extra	By	12
Indophenol powder	D H	

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Name of Dye.	Agent.	Method.
Indophenol White, paste	C, D H	
Indophor	B	
Induline. .B, B K, By, C J, C R, D, L P, N J, R D, W		3
Induline alcohol soluble..B, B K, By, C J, C R, F, I, L P, N J, R D, tM, W		
Induline 3 B	L P	3
Induline 6 B	A	3
Induline B E	P	3
Induline N N	B	3
Induline R & B	K	3
Induline Scarlet	B	11
Ingrain Colors—Red, Orange, Yellow, Bordeaux, Marron, Crimson, Brown (see Primuline)		
Intense Blue	By	3
Iodine Eosine B		3—17
Iodine Eosine G		
Iodine Eosine	Mo	
Iodine Green		
Iodine Violet		3—8—11
Iris Blue	B	12
Iris Violet	B	3
Isatine Yellow		
Iso Diphenyl Black B	G	12
Iso Diphenyl Black R	G	12
Iso Purpurine		4
Iso Rubin	A	3—8—11
Italian Green	Cl Co, L D	12f
Janus Blue R	Kchl	3
Janus Bordeaux B	Kchl	3
Janus Brown B	Kchl	3
Janus Brown R	Kchl	3
Janus Gray B	Kchl	3
Janus Gray B B	Kchl	3
Janus Green B	Kchl	3
Janus Red B patented	Kchl	3
Janus Yellow R	Kchl	3
Jasmine	G	3—8
Jaune II	M Ly	
Jaune acide	D H, L P	
Jaune acide	A, F, P, P S, R F	
Jaune acide C	M Ly	
Jaune Anglais		
Jaune Anthracène C=Anthracene Yellow C [C]	M Ly	3—4
Jaune Anthracène G G= Anthracene Yellow G G [C]	M Ly	4
Jaune brillant	L P	
Jaune brillant	A, By, L, S B	
Jaune d'Alizarine F S	D H	
Jaune d'Aniline = { Aniline Yellow Orange IV,		

Name of Dye.	Agent.	Method
Jaune Diamine N	MLy	
Jaune de Quinoléine soluble	A, B, By, R F	
Jaune direct	K	
Jaune d'or	D H, M Ly	
Jaune d'or Diamine	M Ly	
Jaune d'Orient		
Jaune foulon O O = Fulling Yellow O O [C]	M Ly	
Jaune G (Métanil extra)	M Ly	
Jaune Indien G	M Ly	
Jaune métanile. A, B, B K, By, D, D H, Fi, G, K, O, S B, tM		
Jaune métanile bromé	P	
Jaune Naphthol	S B	
Jaune résistant au savon	P	
Jaune Soleil	A, By, G, L, S B	
Jaune solide	B, By, L P, M Ly, S B	
Jaune solide Diamine A = Diamine Fast Yellow A [C] M Ly		
Jaune solide Diamine B = Diamine Fast Yellow B [C] M Ly		
Jaune solide N	P	
Jet Black R	By	2—3
Kaiser Red		3—11
Kaiser Yellow		3
Kanarine	D H	
Kanthosine J		
Kanthosine R		
Katigene Black Brown N	By	12e
Kermesine Orange	L	3
Keton Blue 4 B N solution	M	3—8
Keton Blue G	M	3—8
Keton Blue R	M	3—8
Kresotine Yellow G	A, By, O	12
Kresotine Yellow R	A, By, O	12
Kresol Red	B	
Lackmoïd		
Lake Scarlet F R	C	3
Lake Scarlet F R R	C	3
Lake Scarlet F R R R	C	3
Lake Scarlet G G	C	3
Lake Scarlet 2 R	C	3
Lanacyl Alizarine Violet R	C	2a
Lanafuchsine S B	C	3
Lanafuchsine S G	C	3
Lancaster Yellow		
Lauth's Violet		
Lazuline Blue R	By	3
Leather Brown		3—11
Leather Brown	O	

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Name of Dye.	Agent.	Method.
Leather Brown	M	
Leather Yellow	D, D H, L, M	
Light Blue	tM	
Light Blue superfine alcohol soluble	M	
Light Green	K B	
Light Green S F bluish	B	3—8
Light Green S F yellowish	B	
London Blue extra	Br S	8—11
Lutécienne		
Luteoline		
Lutetienne		
Lyons Red A	S S	2—3—7
Lydine		
Madras Blue B	F T M	
Madras Blue B	At	3
Madras Blue G	S S	12
Madras Blue R R	At	3
Madras Blue R	F T M	
Magdala Red	D H	
Magenta	H, H M, K B, R D, Sch	2—7—11
Magenta Base	K B	2—7—11
Magenta large crystals B	C	3
Magenta No. 1	I	3—11
Mais		3—8—12f
Malachite Green	A, C J, C R, D H, F, K, K B, M, P S, R E, tM	3—8—11
Malachite Green B	B	3—8—11
Malachite Green G	B	3—8—11
Malachite Green alcohol soluble	A	
Malbery Blue		3—8—11
Malta Gray	P	11
Manchester Brown	C, C V, Lev, R D, T, W	3—8—11
Manchester Brown E E	C, Lev	3—12
Manchester Brown P S	C	3—11
Manchester Yellow	Lev, R D	3
Mandarine		3—8
Mandarine G extra	A, B K	3—8
Mandarine G R	A	3
Marron	N J	
Marron S	B	3
Mars Red G	B	
Martius Yellow	B K	3
Mauve		
Mauve Dye		
Mauveine		
Mazarine Blue R N S	A C	4
Mekon Yellow G	D H	12e
Mekon Yellow R	D H	12
Meldolas Blue		11
Merino Blue	S S	12

Name of Dye.	Agent.	Method.
Merino Blue R	P	12
Merino Brown	S S	12
Metamine Blue B	L	11
Metamine Blue G	L	11
Metanil Yellow. A, B, B K, By, D, D H, Fi, G, K, O, S B, tM		3
Metanil extra Yellow G	M Ly	3
Metaphenylene Blue B	C	11
Metaphenylene Blue B B	C	11
Methyl Alkali Blue.....	B, D H, G, K, O, M	
Methyl Blue	C, tM	8—11
Methyl Blue for Cotton.....	G K, M, O	3—8—11
Methyl Blue for Silk M L B	M	
Methyl Blue New.....	G	
Methyl Cotton Blue	G	8—11
Methyl Diphenylamine Blue	M	
Methylene Blue	P	11
Methylene Blue B	B	11
Methylene Blue B B	M, A	11
Methylene Blue B B crystals	C R, M	11
Methylene Blue B B in powder extra....	A, B, F, M	11
Methylene Blue D, B B extra	M	11
Methylene Blue in powder I or D, extra D	M, A	11
Methylene Blue B G.....	B	11
Methylene Gray O, N D, N F	M	11
Methylene Green extra yellowish G conc	M	12
Methylene Green extra yellow		12
Methylene Violet	D H	
Methylene Violet R R A	M	11
Methylene Violet 3 R A	M	11
Methyl Eosine	A	3—8
Methyl Eosine	I, Mo	
Methyl Green	A, By, K, K B, R D	7
Methyl Green	A, By, P	
Methylindone B, R	C, M Ly	11
Methyl Violet B, 2 B..	A, B, By, B K, C, C J, C R, F, K B, M, N J, O, R D, R E, tM	3—8—11
Methyl Violet 6 B	A, B K, C, K, M, N J, O, P	3—8—11
Methyl Violet 6 B crystals.....	B, I	1—11
Methyl Violet 7 B	B K	3—8—11
Methyl Violet 3 B O	Bch	2
Methyl Violet B B, 72 O	C	12
Methyl Violet R O	C	12
Methyl Violet S 7 B	P K	3
Methyl Violet V 3	K	3—8—11
Methyl Water Blue	B	8—11
Metternicht's Green		
Mikado Brown B	L, S B	12f
Mikado Brown 3 G O	L, S B	12f
Mikado Brown M	L, S B	12f
Mikado Gold Yellow 2 G	L	12f

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Name of Dye.	Agent.	Method.
Mikado Gold Yellow 4 G	L	12f
Mikado Gold Yellow 6 G	L	12f
Mikado Gold Yellow 8 G	L	12f
Mikado Orange G	L, S B	12
Mikado Orange R	L, S B	12
Mikado Orange 2 R	L, S B	12
Mikado Orange 3 R	L, S B	12
Mikado Orange 4 R	L, S B	12
Mikado Orange 5 R	L, S B	12
Mikado Yellow	L, S B	12
Milling Red F R	C	3
Milling Red G	C	3
Milling Yellow II	C	3
Milling Yellow O	C	3
Milling Yellow No. 55	S S	3
Mimosa	G	12
Moline	At	4
Mordant Yellow	B	3
Mordant Yellow O	M	4
Murexide		
Muscarine	D H	11
Naccarat	P	3
Nankin in cake	J B	
Naphthal Yellow R S	By	
Naphthaline Pink = Magdala Red.		
Naphthaline Red	N J	
Naphthaline Red = Magdala Red.		
Naphthaline Scarlet = Magdala Red.		
Naphthaline Yellow	C, D, F	3
Naphthamine Blue 2 B patented	K	12
Naphthamine Blue 5 B patented	K	12
Naphthamine Blue B R	K	12
Naphthamine Blue 2 R patented	K	12
Naphthamine Blue 3 R patented	K	12
Naphthamine Indigo Blue G patented	K	12
Naphthamine Indigo Blue 2 R patented	K	12
Naphthamine Indigo Blue 2 B patented	K	12
Naphthamine Indigo Blue 5 B patented	K	12
Naphthandoïne B B	C	11-17
Naphthazarine Blue B	O	3
Naphthazarine S	O	4-13
Naphthazarine R	O	
Naphthazine Blue	L, M	3
Naphthazine Blue	D	
Naphthazine Blue O	Kchl	3
Naphthazurine B	O	3
Naphthazurine B B	O	12
Naphthazurine R	O	
Naphthazurine R E	O	3
Naphthion Red = Orseille Substitute V.		

Name of Dye.	Agent.	Method.
Naphthine S	P	
Naphthindone B B, patented	C, M Ly	11
Naphthindone T	C	11
Naphtho Cyanine	E P	
Naphtho Ruby	By	3
Naphthol Black B	C	3
Naphthol Black 3 B	C	3
Naphthol Black 4 B	H	
Naphthol Black 6 B	C, D	3
Naphthol Black 12 B	C, M Ly	12
Naphthol Black P	C	3
Naphthol Black 4 R	C	3
Naphthol Blue B	R E	11
Naphthol Blue D	R E	11
Naphthol Blue R	C R E	11
Naphthol Blue 2 B	P K	12
Naphthol Blue G	C	12
Naphthol Blue Black	C	3
Naphthol Green B	C	6d
Naphthol Orange	A, B K	3—8
α -Naphthol Orange		
β -Naphthol Orange		
Naphthol Red	S B	3
Naphthol Red O	M	3—8
Naphthol Red S	B	
Naphthol Yellow		
Naphthol Yellow S... B, B K, By, C, C R, D H, I, Lev, M, O, R F O		
Naphthol Yellow R S		
Naphthylamine Brown	B	3
Naphthylamine Pink	D H	
Naphthylamine Yellow	K	3
Naphthyl Blue	K	
Naphthyl Blue 2 B	B	12
Naphthyl Blue Black N	C	
Naphthyl Blue Black M N Y	C	3a
Naphthylene Blue R crystals	By	11
Naphthylene Red	By	12b
Naphthylene Violet		
Naphthyl Violet	K	
Narceine	D H	
Navy Blue	S W	3
Navy Blue B	J	
Navy Blue B	A C	3
Navy Blue 2	A P M	3
Navy Blue N R		2
Nawa Green Crystals	K B	
Neptune Green	B	
Neptune Green S	B	3
Neropaline	Gb	
Neutral Blue	C, M Ly	11

Name of Dye.	Agent.	Method.
Neutral Gray G	A	
Neutral Red	C	
Neutral Scarlet	L	
Neutral Violet	C, M Ly	
Neutral Violet O	L	1-12
New Blue B	C, I	11
New Blue G	tM	11
New Blue R	B K, By, C, C R, D, I, tM	11
New Coccine	A, M, R F	3
New Coccine R	A	3
New Cotton Solid Blue	I	11
New Croceine	P K	3
New Direct Blue B	A	12
New Fast Black	B & L	
New Fast Blue in paste F, H	By	
New Fast Gray	By	
New Fuchsine	M	3-8-11
New Gray	By	11
New Gray	By	3-12
New Green	By, K B	3-8-11
New Green	M	
New Indigo	I	12
New Metamine Blue M	L	
New Methylene Blue B B	C	11
New Methylene Blue G G	C	11
New Methylene Blue N	C	11
New Methylene Blue R	C	11
New Methylene Blue 3 R	C	11
New Methylene Gray B G	M	11
New Patent Blue B	By	3
New Patent Blue 4 B	By	3
New Pink		
New Phosphine G	C	11
New Red L	K	3
New Solid Green B B	I	3-8-11
New Solid Green 3 B	I	3-8-11
New Toluylene Blue B	O	12
New Toluylene Brown B	O	12
New Toluylene Brown B B	O	12
New Victoria Black B	By	
New Victoria Black Blue	By	
New Victoria Blue R	By	
New Victoria Green	B, K B	3-11
New Yellow	B K	
New Yellow	By	3
New Yellow L	K	
New Yellow	tM	3
Nicholson Blue	Br S	
Nigramine	N J	11
Night Blue	B, I	
Night Green		

Name of Dye.	Agent.	Method.
Nigrisine	P	
Nigrisine B		
Nigrisine J	P	11
Nigrosine alcohol soluble..A, B, B K, C J, D, G, N J,	P S, R	3
Nigrosine water soluble..A, B K, C J, D, D H, F, G,	K, N J, P S, R, S B	3
Nile Blue A	B	11
Nile Blue 2 B	B	11
Nile Blue N N	B	11
Nile Blue R	B	11
p-Nitraniline Red (Nitrosamine Red).....		
Nitrazine Yellow	O	
Nitrobenzole Fuchsin	K B	
Nitrophenine	Cl O	12
Nitrosamine Red	B	7—15b
Noir à l'alcool	K	
Noir-Bleu Naphthyl N = Naphthyl Blue Black N [C]	M Ly	
Noir-Bleu Diamine E	M Ly	
Noir C N N	P	
Noir de Lyons	Mo	
Noir Diamine B	M Ly	
Noir Diamine B H = Diamond Black B H [C]..	M Ly	
Noir Diamine M L = Diamond Black H W [C]..	M Ly	
Noir Diamine R O	M Ly	
Noir mi-laine A = Half-wool Black [C].....	M Ly	
Noir mi-laine S = Half-wool Black S [C].....	M Ly	
Noir Naphthol 6 B	M Ly	
Noir Naphthol 12 B	M Ly	
Noir Naphthylamine 6 B = Naphthylamine Black	6 B [C]	M Ly
Noir Naphthylamine D	M Ly	
Noir Oxy-Diamine N = Oxy-Diamine Black N [C]..	M Ly	
Noir Oxy-Diamine SOOO = Oxy-Diamine Deep Black	SOOO [C]	M Ly
Noir pour laine	R F	11
Noir Vidal	P	12
Noir Vidal S	P	12
Non Mordant Cotton Blue	Br S	
Nopaline	tM	
Nyanza Black B	A	
Oenanthinine	D H	3—8
Old Gold No. 203 powder	A P M	12
Old Gold S C	S W	12
Old Scarlet	By	3
Oleïne	B L	12
Opal Blue	Br S, C	

Name of Dye.	Agent.	Method.
Opaline Black 1,602	Beh	12
Opaline 2 G	Gb	
Opaline 5 G	Gb	
Opaline R	Gb	
Oramine Blue R	P K	12
Orange	tM	3
Orange A	L	3—8
Orange I	By, D H, K, M, R D, R F, tM, W	3—8
Orangé No. 1	P	3—8
Orange II..B, B K, C R, D H, F, Fi, I, K, Lev, M, M Ly, P S, R D, R F, tM, W		3—8
Orangé No. 2	P	3—8
Orange III	D H, P, R D, R F, tM, W	3—8
Orangé No. 3	P	3
Orange IV..B, B K, D, D H, F, Fi, G, K, L P, M, M Ly, P, R D, R F, S B		3—8
Orangé No. 4	P	3
Orangé au tannin R = Tannin Orange R [C]..	M Ly	
Orangé Cerasine G	M Ly	
Orangé Diamine B = Diamine Orange B.....	M Ly	
Orange E N L	C, M Ly	3
Orange E N Z	C	3
Orange extra	C	3—8
Orange G	A, B, M, R F	3
Orange G	B K	3—8
Orange G G	B K, C, D, M Ly	3
Orangé G G en cristaux	M Ly	3
Orange G R X	B	3
Orange G S	O	3
Orange G T	By	3
Orange M	Bi	3
Orange M G paste	P	3
Orangé Mikado G	L, S B	12
Orangé Mikado R	L, S B	12
Orangé Mikado 2 R	L, S B	12
Orangé Mikado 3 R	L, S B	12
Orangé Mikado 4 R	L, S B	12
Orangé Mikado 5 R	L, S B	12
Orange M N	I	3
Orange N	K	3
Orange N	B, I	3
Orange P	O	3—8
Orange R	S	4
Orange R.....	B K, C, D H, I, tM	3
Orange R	B	3
Orange R L	C	3
Orange R N	C	3
Orange R R = Orange R [B].....	Bi	3
Orange R R L	C	3
Orange Red I = Double Brilliant Scarlet G [A].....		3
Orange T	K	3

Name of Dye.	Agent.	Method.
Orange T A	A	
Orange Yellow = Orange G		3
Orcelline	H R	
Orcelline No. 4		3
Oriol Yellow	G	12
Orseille Brillante C = Brillant Orseille C [C]..	M Ly	
Orseille Brown		
Orseille Red A	B	3
Orseille Substitute G	A	
Orseille Substitute N extra	C	3
Orseille Substitute V	A	3
Orseille Substitute V	C R, Fi, P	3
Orseille Substitute 3 V N	P	3
Orselline B B	By	3
Orchil crimson powder	P K	3
Oxamine Blue B	B	
Oxamine Blue B	F	
Oxamine Blue 4 B	F	
Oxamine Blue R	F	
Oxamine Blue 3 R	B	12
Oxamine Blue R X	P K	12
Oxamine Blue Black B	F	
Oxamine Blue Black R	F	
Oxamine Maroon	B	12
Oxamine Red	B	12
Oxamine Scarlet B	F	
Oxamine Violet	B	12
Oxblood 8,851	Bs	12
Oxy-Diamine Black A patented	C	12
Oxy-Diamine Black A M patented	C	12
Oxy-Diamine Black A T patented	C	12
Oxy-Diamine Black B G patented	C	12
Oxy-Diamine Black B M patented	C	12
Oxy-Diamine Black B Z patented	C	12
Oxy-Diamine Black D patented	C	12
Oxy-Diamine Black N patented	C	12
Oxy-Diamine Black N R patented	C	12
Oxy-Diamine Black N R T patented	C	12
Oxy-Diamine Black R R patented	C	12a
Oxy-Diamine Black S O O O patented	C	12
Oxy-Diamine Black W patented	C	12
Oxy-Diamine Blue 3 R patented	C	12
Oxy-Diamine Orange G patented	C	12
Oxy-Diamine Orange R patented	C	12
Oxy-Diamine Yellow G G patented	C	12
Oxyphenine	Cl Co	
Oxyphenine Gold	Cl Co	
Paeonine	G, L P, L O, Mo	
Palatine Black	B	
Palatine Orange		

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Name of Dye.	Agent.	Method.
Palatine Red	B	3
Palatine Scarlet	B	3
Paper Scarlet bluish	M	
Para Blue	N J	11
Para Fuchsine	K	3—8—11
Paramine Brown C & R	C R	12
Paramine Indigo Blue	C R	12—15b
Paramine Navy Blue R	C R	12—15b
Para Nitraniline Red		
Para Phenylene Blue R	D	11
Para Phenylene Violet	D	11
Para Sulferine S	B K	
Paris Green = Methyl Green		
Paris Violet	P	11
Paris Violet 6 B	R E	11
Paris Violet 7 B	R E	11
Parma R paste	S	4—11
Patent Atlas Red		
Patent Blue A	M	3
Patent Blue N superfine conc.....	M	3
Patent Blue V	M	3
Patent Fustic or Fustin O	Wood & Bedford	4
Patent Fustic G	Wood & Bedford	4
Patent Green V	M	3—8
Patent Orange	A	3
Patent Phosphine	I	12
Paten Rock Scarlet	Br S	12b
Pegu Brown G	L	12
Pelikan Blue		
Perkins Violet		
Persian Yellow	G	4
Persulphocyan Yellow		
Phenamine		
Phenamine Blue B, G, R.....	B	3
Phenanthrene Red		
Phenethol Red		
Phénicienne		
Phénicin		
Phenix Red A	C	3
Phenocyanine	D H	6a
Phenocyanine B	D H	6a
Phenocyanine D	D H	6a
Phenocyanine T B	I	4
Phenocyanine V S.....	I	4
Phenol Flavine	O	3
Phenol Black S S	By	
Phenolphthaleine		
Phenosafranine		
Phenyl Brown		
Phenylene Black	P	3

Name of Dye.	Agent.	Method.
Phenylene Black paste	P	2
Phenylene Blue	B K	11
Phenylene Brown		3—11
Philadelphia Yellow G	A	
Phloxine	M, A	
Phloxine	C, C J, D H, F, M	
Phloxine Iodine free	B	
Phloxine P	B	
Phloxine T A	Mo	
Phosphine...B, Br S, C, M, M Ly, N I, O, P, PS, S B		11
Phosphine II	C	
Phosphine N	K	
Phosphine P	M	2a—7—11
Phosphine nouvelle G = New Phosphine [C]..	M Ly	11
Phthaline Navy Blue	A P M	
Phtaline Wool Black B	A P M	3
Picryl Orange		
Picryl Yellow		
Pigment Brown	B	
Pink		11
Pittakal		
Pluto Black B	By	12
Pluto Black G	By	12b
Pluto Black R	By	12b
Polychromine	G	12—15
Polychromine B	G	12—15
Ponceau acide	D H, S	
Ponceau aux cristaux 6 R	M Ly	
Ponceau B extra	M	3
Ponceau B O extra	A	
Ponceau brillant 4 R	M Ly	
Ponceau d'Orient		
Ponceau G	C, B K, Lev, M	3
Ponceau 2 G	A, B, B K, M	3—8
Ponceau 4 G B	A, B K	3
Ponceau G R	M	3
Ponceau J	M Ly	3
Ponceau J J	M Ly	3—8
Ponceau R	A, M	3
Ponceau 2 R	A, B, B K, F, Lev, M, P, R F	3
Ponceau 2 R S	P	3
Ponceau 3 R B	A	3
Ponceau 3 R B	P K	3
Ponceau 4 R	A, B, M	3
Ponceau 4 R	B K	
Ponceau 4 R B	A	3—17
Ponceau 5 R	M	
Ponceau 6 R	M, B	
Ponceau 6 R B	A	
Ponceau 10 R B	A	
Ponceau R T		

Name of Dye.	Agent.	Method.
Ponceau S extra = Fast Ponceau 2 B [B]	A	3
Ponceau S S extra	A	
Ponceau Y B	M	
Pourpre	L P	3—8
Prague Alizarine Yellow G	Ki	4—13
Prague Alizarine Yellow R	Ki	4—13
Primrose	S	
Primrose à l'alcool D H	D H	
Primrose à l'alcool		
Primrose soluble	D H	3—12b
Primula		3—8—11
Primuline	B, Br S, By, C, G, K, L P M Ly	12—15
Primuline O	L	12—15
Printing Black for Wool	B	
Printing Blue	A	
Printing Blue H	C	
Printing Blue B	M	
Printing Blue R	M	
Propiol Acid		
Prune pure	C	
Pure Blue	C, B, I, L	8—11
Pure Blue B S J	I	8—11
Purpurine in paste	B, B A Co, By	17
Purpurine S in paste	B, By	
Purpurine brillante R	R F	3
Purpurine brillante 4 R	R F	
Pyramine Orange	B	12—12b
Pyronine B	By, L, S B	3—8—12
Pyronine G	By, L, S B	3—8—12
Pyrosine B	Mo	3—17
Pyrosine J	Mo	3
Pyrotine Orange	D	3
Pyrotine R R O	D	
Rauracienne		
Red B	B, Fi	
Red C = Soudan III	B	
Red Coralline		
Red Violet R S	B	3
Red Violet 4 R S	B	3
Red Violet 5 R extra	B, K B	3—8—11
Red Violet 5 R S	B	3
Regina Purple	Br S	1
Regina Violet	Br S	1
Regina Violet alcohol soluble	A	3—8
Regina violet water soluble	A	3—8
Resorcine Blue		
Resorcine Brown	A	3
Resorcine Yellow	A, B K, Fi, K, R F	3—8
Resorcine Violet		
Resorgyl Yellow	R F	12

Name of Dye.	Agent.	Method.
Rheonine	B	12
Rhodamine 13	C	12
Rhodamine B	B, I	3-8-11
Rhodamine B extra	B, I	3-8-11
Rhodamine 3 B	B, I	3-8-11
Rhodamine G	B, I	3-8-11
Rhodamine G extra	B, I	3-8-11
Rhodamine 3 G	Bs	7
Rhodamine 5 G	Bs	11
Rhodamine 6 G	B, I	3-8-11
Rhodamine O	B, Klp	3-8-11
Rhodamine extra B	B, Klp	3-8-11
Rhodamine B extra	B, Klp	3-8-11
Rhodamine S	B, By, I	11
Rhodindine (see Azo Carmine G paste [B]).		
Rhoduline Red B	By	11
Rhoduline Red G	By	11
Rhoduline Red S	By	11
Rhoduline Violet	By	11
Roccelline.. B K, C, D H, G, I, L P, P, P C, R F, S, tM		3
Rock Scarlet Y S	Br S	3
Rosazine	P	3
Rosazurine	By	
Rosazurine B	By	12e
Rosazurine B B	By	
Rosazurine G	By	12e
Rose B à l'eau	I	3-17
Rose Bengale	B F	3
Rose Bengale	B, C, S	3
Rose Bengale A T	A, B	3
Rose Bengale 3 B	M	3
Rose Bengale G	M	3
Rose Bengale N	C, M Ly	3
Rose de Benzoyl	P	12
Rose Diamine B extra = Diamine Pink B extra [C]		
	M Ly	
Rose J B à l'alcool	J	
Rose Magdala	D H	
Roseine	Br S	7-11
Roseline B, G, 3 G, R	M	
Rosinduline 2 B bluish	K	3
Rosinduline G	K	3-8
Rosinduline 2 G	K	3
Rosolan	M	
Rosolan	P	3-7
Rosol Acid		
Rosophenine	Cl O	12
Rosophenoline		
Rouge I	M Ly	3
Rouge azoïque = Azo Red A [C]	M Ly	
Rouge B	M Ly	3-8

Name of Dye.	Agent.	Method.
Rouge Cerasine	M Ly	
Rouge Chromazone	G	3
Rouge Congo	R F	3—12
Rouge Congo brillante G	R F	
Rouge Congo brillante R	R F	
Rouge Congo 4 R	R F	12e
Rouge d'acridine B, B B, 3 B	L, S B	
Rouge de Lyons A	S S	
Rouge de Naples		
Rouge de St. Denis	P	12b
Rouge Diamine B	R F	
Rouge Diamine 3 B	R F	
Rouge Diamine N O	M Ly	
Rouge d'oxy-amidodiphényle	Mo	
Rouge foulon G = Fulling Red G [C]	M Ly	
Rouge Français		
Rouge Kyrmezzine	S	
Rouge M	Mo	12
Rouge neutre extra	M Ly	
Rouge Rubis A	M Ly	
Rouge solide Diamine F	M Ly	
Roxamine	D H	
Royal Green crystals	K B	
Rubeosine		
Rubianite		
Rubidine	B K	3
Rubin	A	7—11
Ruby Ia small crystals	K B	
Rubin S	A	3—8
Rubramine	N J	11
Rufigallol	B	4
Russian Green	L	6a
Russian Leather Red	C, O, P J, P S, N J	
Saffraniline	G	3—8—11
Saffranine	C R, D H, F, G, N J	11
Saffranine A G extra	K	11
Saffranine A G T extra	K	11
Saffranine conc	M	11
Saffranine extra G	A	11
Saffranine F B extra	B	
Saffranine F F extra No. 0	By	11
Saffranine G extra, G G S, S	C	11
Saffranine M N	P K	11
Saffranine P K	C, G, F	11
Saffranine Purple	P K	11
Saffranine S 150	C	11
Saffranine T	B	11
Saffranine Scarlet		
Saffran Substitute		
Saffrosine	I, Br S	3—8

ALPHABETICAL LIST OF DYES.

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Name of Dye.	Agent.	Method.
Salicine Yellow	K	12
Salicine Yellow G, 2 G	K	3
Salicyl Orange		
Salicyl Yellow A		
Salicyl Yellow B		
Salmon Red	A	
Salmon Red	B	12b
Salmon Red	N J	11
Sambesi Black B	A	12
Sambesi Black B R	A	12
Sambesi Black 3 B	A	12
Sambesi Black D	A	12
Sambesi Black F	A	12
Sambesi Blue B	A	12
Sambesi Blue B X	A	12
Sambesi Blue R	A	12
Sambesi Blue R X	A	12
Sambesi Brown	A	12
Sambesi Gray B	A	12
Scarlet 50	H	3
Scarlet 6,503	C	3
Scarlet	F	3
Scarlet Cardinal	P S	3
Scarlet E C	C	3
Scarlet F R	C	3
Scarlet F R R	C	3
Scarlet F R, R R	C	3
Scarlet for Cotton		3
Scarlet for Silk	M	3
Scarlet G		3
Scarlet G R	A	3
Scarlet R	By	3
Scarlet 6 R	Kchl	3
Scarlet N R	S S	3
Scarlet N R R	S S	3
Seal Brown G	S S	12
Silk Blue	M	7—11
Silk Gray O	M	7
Silk Induline B	K	
Smaragd Green	By, K B	
Solferino		
Solid Blue	O	3
Solid Blue B alcohol soluble	G	
Solid Blue R alcohol soluble	G	
Solid Blue R water soluble	G	
Solid Blue T water soluble	G	
Solid Green crystals	C, P S	3—8—11
Solid Green G	D H	4
Solid Green J	Mo, P	3—8—11
Solid Green J J O	I	3—8—11
Solid Green O	I	

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Name of Dye.	Agent.	Method.
Solid Green O in paste	C R, M	6a
Solid Violet	D H	4—13a
Solid Yellow N	P	3
Soluble Blue	Br S, R D	8—11
Soluble Blue B	Beh	3
Soluble Blue 8 B	Br S	8—11
Soluble Blue 10 B	Br S	8—11
Soluble Blue X G	Br S	11
Soluble Blue X L	Br S	11
Sorbin Red	B	3—4
Soudan I	A, Fi, Jb	
Soudan II	A	
Soudan III	A, Fi, Jb	
Soudan G	A, Fi, Jb	
Soudan R	A	
Soudan Black 1, 2, 3	S S	3
Soudan Black B	S S	3
Soudan Black R, 2 R	S S	3
Soudan Brown	A, Fi	
Soudan Red = Magdala Red.		
Stanley Red	Cl Co	
Standard Blue	A P M	12
Standard Brown	A P M	12
Standard Cutch Shade	A P M	12
Standard Fast Blue	A P M	12
Standard Fast Brown	A P M	12
Standard Fast Red	A P M	12
Standard Fast Tan	A P M	12
Standard Fast Yellow	A P M	12
Standard Red	A P M	12
Standard Yellow	A P M	12
Sterosine Gray	H	
Stilben Red	A	12
Sulfamine Brown A	D	4
Sulfamine Brown B	D	4
Sulfamine Brown D No. 93	Bs	4
Sulfanil Yellow		12
Sulfin Colors (see Cachou de Laval)		15
Sulfon Acid Blue B	By	3d
Sulfon Acid Blue R	By	3d
Sulfon Azurine	By 1—11—12e	
Sulphin	B	12—12b
Sulpho Black G	By	3d
Sulpho Black R	By	3d
Sulpho Cyanine G	By	3d—4
Sulpho Cyanine 3 R	By	3d—4
Sulpho Cyanine 5 R & G R	By	
Sulpho Green	P	3
Sulpho Yellow S	K	
Sun Yellow	A, By, G, L, S B	12
Sun Gold		

Name of Dye.	Agent.	Method.
Superfine (fine) Magenta crystals	K B	
Superfine Violet	K B	
Superior Violet	K B	
Superior New Green crystals	K B	
Swiss Black C	S W	12
Swiss Black D	S W	12
Swiss Black B G	S W	12
Swiss Violet R extra	At	3
Tabora Black	A	
Tannin Brown B	C	11
Tannin Heliotrope	C	11
Tannin Indigo	D H	
Tannin Orange R	C	11
Tartrazine	B, I	3—8
Tennyson Red	H	
Terra cotta F	G	12
Terra cotta R	G	4
Thiamine Yellow	Br S	
Thiazine Brown G	B	12f
Thiazine Brown R	B	12f
Thiazine Red G	B	12f
Thiazine Red R	B	12f
Thiazol Yellow	By	7—11
Thio Brown 2 B	D	
Thio Brown R	Bs	12
Thio Carmine R	C	3—8
Thio Carmine R paste	M Ly	3—8
Thio Catechine S	P	
Thio Catechine No. 1, No. 2, No. 3, No. 4	S S	3
Thio Chromogene	D	12—12b
Thio Cyanosine	Mo	
Thio Flavine T	C, M Ly	11
Thio Flavine S	C, M Ly	12b
Thionine		
Thionine Blue G, O extra	M	11
Thio Orange G	D	
Thio Phloxine	Mo	
Thio Phosphine J	L P	
Thio Pyronine		
Thio Ruby	D	3
Thio Vesuvine	Bs	3
Thio Yellow G	Bs	12
Thio Yellow R M	Bs	12
Thio Yellow R	D	12
Titan Black E D	H	12
Titan Blue B	H	12
Titan Blue B B B	H	12
Titan Blue S	H	12
Titan Brown O	H	12
Titan Brown R	H	12

Name of Dye.	Agent.	Method.
Titan Como G	H	12
Titan Como R	H	12
Titan Como S	H	12
Titan Gold	H	12
Titan Gray	H	12
Titan Navy B	H	12
Titan Navy R	H	12
Titan Orange N	H	12
Titan Pink = Clayton Cloth Red	H	12
Titan Red	H	12
Titan Red 6 B	H	12
Titan Scarlet C = Stanley Red	H	12
Titan Scarlet C B	H	12
Titan Scarlet D	H	12
Titan Scarlet S	H	12
Titan Sky Blue	H	12
Titan Yellow H	H	12
Titan Yellow R	H	12
Titan Yellow Y	H	12
Tolan Red I	K	3
Tolan Red II	K	3
Tolan Red B patented	K	3
Toledo Blue O	Bs	4b
Toluidine Blue	A, B, O	11
Toluidine Blue O	A, B, O	11
Toluylene Blue B for Cotton	O	11
Toluylene Blue R	O	11—12
Toluylene Brown	By, O	12e
Toluylene Brown G	O	12e
Toluylene Brown R	O	12
Toluylene Dark Blue	O	12
Toluylene Orange G	A, By, O	12
Toluylene Orange R	O	12
Toluylene Orange R R	O	12e
Toluyene Red = Neutral Red	O	11
Toluylene Yellow	O	12
Toluylene Yellow S G	O	11
Triamine Black B	I	12
Triamine Black B T or M J	I	12
Triamine Blue B N W	I	12
Triamine Blue M J	I	12
Triamine Blue M N W	I	12
Triamine Blue T N W	I	12
Tropaeoline D		3—8
Tropaeoline G	C	3—8
Tropaeoline O	C	3—8
Tropaeoline O O	C	3
Tropaeoline O O O No. 1		3—8
Tropaeoline O O O No. 2		3—8
Tropaeoline O O O O		3—8
Tropaeoline R = Tropaeoline O	C	3—8

Name of Dye.	Agent.	Method.
Tropaeoline Y		3—8
Turkey Red	A P M	12
Tumerine	C	12
Turquoise Blue B B	By	
Turquoise Blue G	By	
Tyraline		
Tyrian Purple		
Union Black B	C	1
Union Black B B	C	1
Union Black S	C	12
Union Blue D C	C	12
Union Blue R	A	3—12
Urania Blue	D	3—8
Uranine	A, B, Br S, L, M, tM	3—8
Ursol D	A	
Ursol P	A	
Usebe Green		
Vacanceïne Blue	H	
Vacanceïne Scarlet	H	
Vat Red Powder	H	
Vat Red Paste	H	
Verde Italiano	L D	12f
Vert acide J J extra concentré	M Ly	3—8
Vert brillant = Brilliant Green		3—8—11
Vert de methylaniline = Methyl Green.		
Vert de Paris		
Vert Diamant	Mo	
Vert Diamine B	M Ly	
Vert Diamine G = Diamine Green G [C]	M Ly	
Vert en pâte		
Vert etincelle		
Vert lumière		
Vert lumière	K B	
Vert Naphtol B	M Ly	
Vert solide cristaux O	M Ly	
Vesuvine	B, M	2a—7—11
Vesuvine B	B	2a—7—11
Victoria Black B	By	3
Victoria Black G	By	
Victoria Black 5 G	By	
Victoria Blue B	B, I	3—8—11
Victoria Blue B S alcohol soluble	B, I	3—8—11
Victoria Blue R	B, I	3—8—11
Victoria Blue 4 R	B, I	3—8—11
Victoria Green 3 B	B	3—8—11
Victoria Orange		
Victoria Red		12e
Victoria Ruby	B K, M	3—8
Victoria Ruby O	M	3—8

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Name of Dye.	Agent.	Method.
Victoria Scarlet R	Kchl	3
Victoria Scarlet 3 R	Kchl	3
Victoria Violet 4 B S	M	2
Victoria Violet 8 B S	M	2
Victoria Yellow		
Victoria Yellow (O Double conc)	M	3
Vidal Black	S S	
Vidal Black S	P	
Vidaline Blue	P	12
Vidaline Blue B B	P	12
Vidaline Blue 5 B	P	11
Vidaline Blue R	S S	12
Vidaline Blue R R	P	12
Vidaline Brown B	S S	12
Vidaline Brown G G	S S	12
Vidaline Green	S S	11
Violamine B	M	3—8
Violamine 3 B	M	3—8
Violamine G	M	3—8
Violamine R	M	3—8
Violaniline		
Violeïne		
Violet A P F	S S	
Violet au Methyl B	M Ly	3—8—11
Violet au Methyl 6 B	M Ly	3—8—11
Violet 5 B	By, K B	11
Violet 6 B	By, K B	11
Violet 7 B	K B	11
Violet Black	B	3—12
Violet Blue A P	S S	
Violet C	P	3—8—11
Violet de methylaniline (see Methyl Violet).		
Violet de Paris	P	3—8—11
Violet direct (see Methyl Violet).		
Violet Diamine N	M Ly	12
Violet Formyl S 4 B	M Ly	3
Violet neutre extra	M Ly	11
Violet neutre solide B	M Ly	11
Violet non plus ultra	K B	3—8—11
Violet pâte	Cz	
Violet phenilique		3
Violet R	Mo	3—8—11
Violet R R	Mo	3—8—11
Violet 5 R	By	3—8—11
Violet 4 R N	I	3—8—11
Violet 3 S O N	P	3
Violet solide	D H	4—13
Violet soluble	K B	3—8—11
Viridine		
Water Blue..B, By, C R, F, G, K B, L, M, O, P S, Sch,	tM	8—11

Name of Dye.	Agent.	Method.
Water Blue B	C	8—11
Water Blue 6 B extra	A, D	8—11
Water Blue B S	C	8—11
Water Blue O O	K	8—11
Water soluble Eosine	M	3—8
White Indephenol = Indephenol White.		
Welters Bitter = Picric Acid.		
Wool Black	A, B	3
Wool Black B	D	
Wool Black B	A	3
Wool Black 4 B	A	3
Wool Black 4 B F	A	3
Wool Black 6 B	A	2—12
Wool Black 6 B	D	2—12
Wool Black G R	A	3
Wool Blue	B	
Wool Blue A F	Fi	
Wool Blue S	B	
Wool Gray	D	
Wool Gray B, G, R	M	
Wool Green S	B, I	3
Wool Green B	I	3
Wool Green S S		
Wool Induline B	K	
Wool Jet Black 2 B	A	3
Wool Jet Black 3 B	A	3a
Wool Red B	C	3
Wool Red extra	K	3—8
Wool Scarlet R	Sch	3
Wool Violet S	B	3
Wool Yellow	B	3
Xanthine	D H, Jb, L, P	
X L Blue	H	12
X L L Blue	H	3
X L Red	H	
X L Soluble Blue	Br S	11
Xylidine Orange	tM	
Xylidine Ponceau = Ponceau 2 R.		
Xylidine Red = Ponceau 2 R.		
Yellow Coralline		
Yellow fat colour		
Yellow fast to soap	P	
Yellow S E	B	3
Yellow S N E	B K	3
Yellow T	I	3
Yellow W	By	3—8
Yellow W R	I	12
Zinaline		



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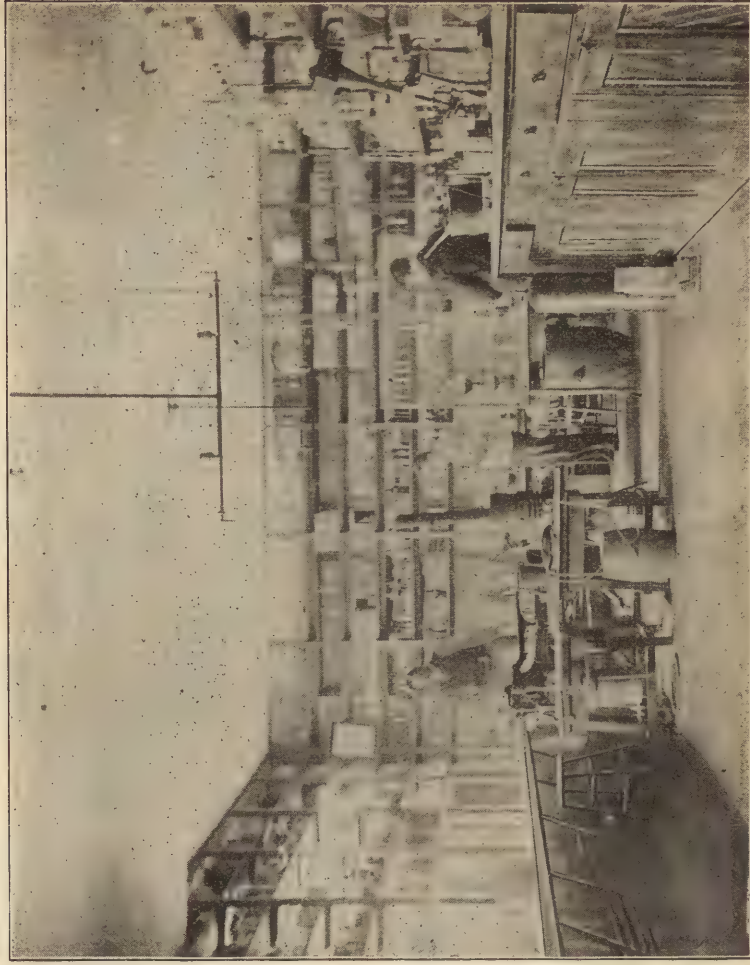
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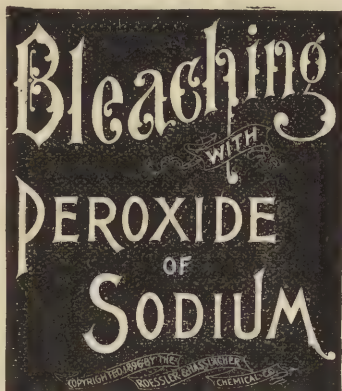
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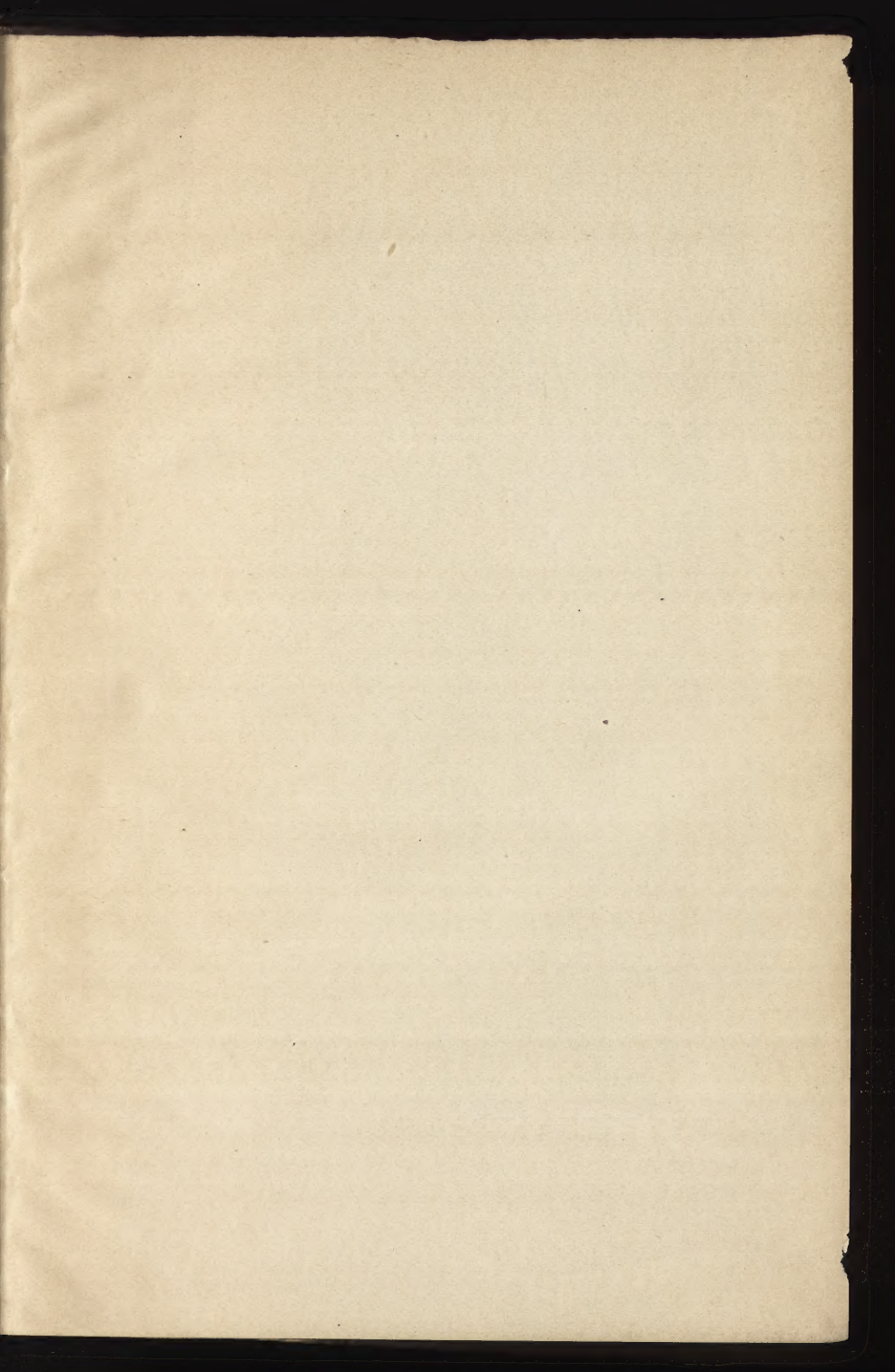
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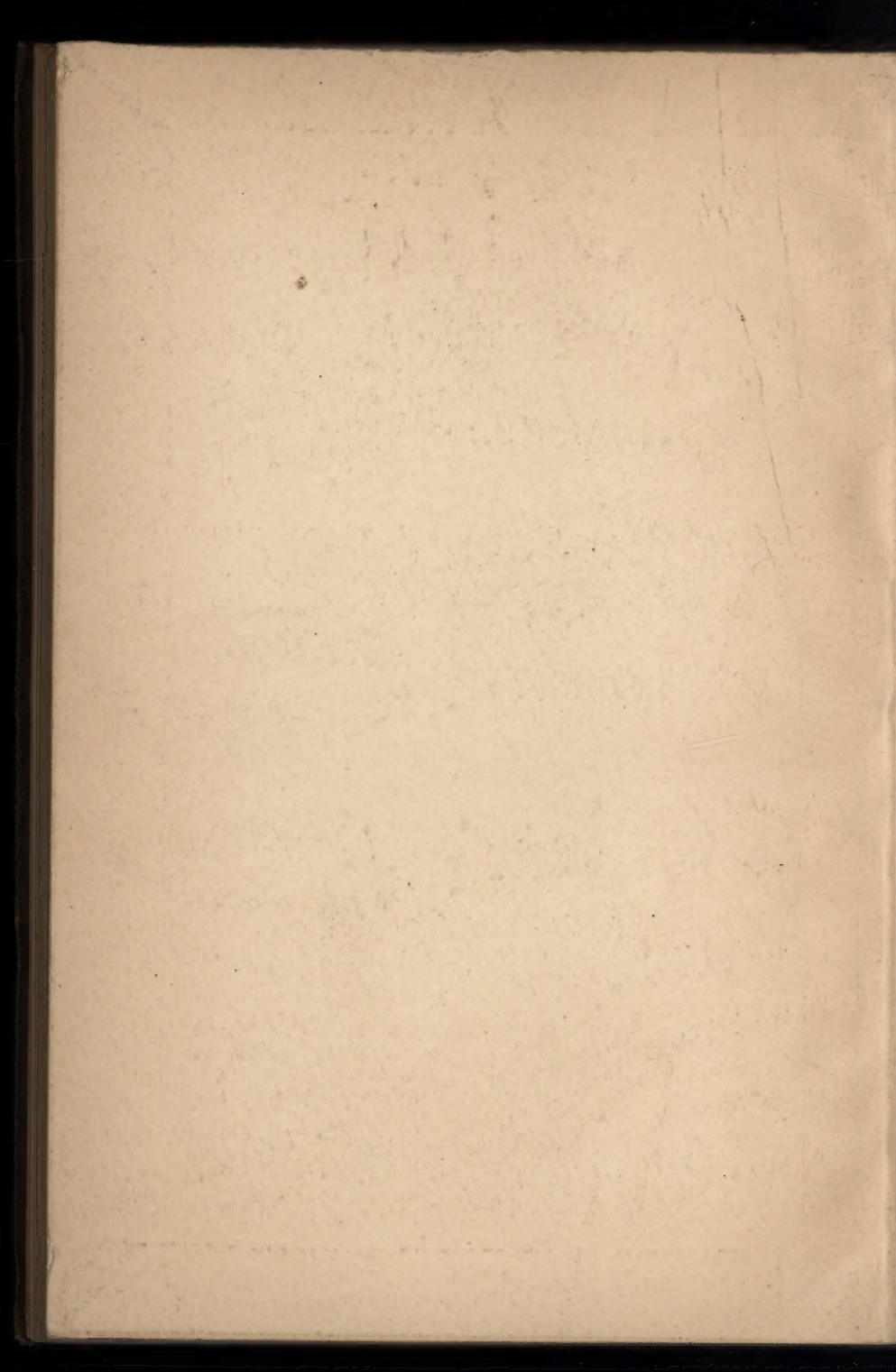
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